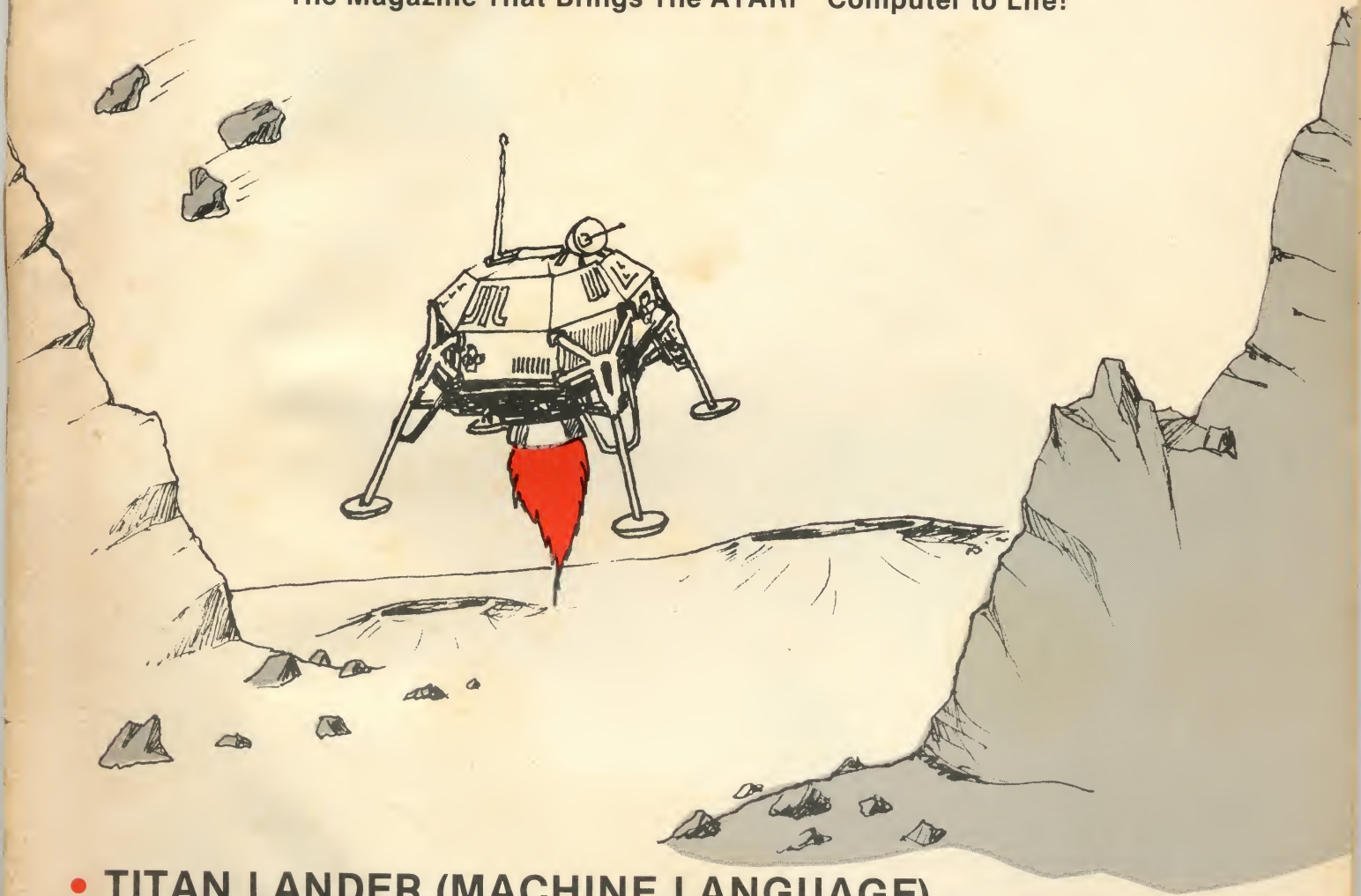


ROM

The Magazine That Brings The ATARI™ Computer to Life!



- TITAN LANDER (MACHINE LANGUAGE)
- STAR BOMB
- SCOTT ADAMS INTERVIEW
- RAVING REVIEWER
- YELLOW BRICK ROAD
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SPECIAL SPACE GAME ISSUE

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Editorial

Well we made it. The second issue of R.O.M. is out and we at ROM hope it will be a smashing success. As you can see we've got more color on the cover and hope to add some color to the inside in the issues to come.

It seems almost everyday that new third party software companies are starting up. The market is beginning to fill up, but there still seems to be room for all these new companies. With the flooding of the market it leaves more room for garbage software to creep in. We at ROM are going to try and show you what software is good and what software isn't worth the disk it is put on.

I remember about three years ago when most of the software available for the Atari was written in Basic. Then as the years passed, more and more machine language programmers came out of the woodwork. If the program was written in machine, it was a best seller, even if the program wasn't that good. Now with the many machine language programs on the market one must be careful on what he or she should buy.

Each issue of ROM will contain a machine language game that has arcade quality graphics and sound. We know that there are many Basic programmers trying to get a grasp on what machine language is all about. We're going to give the assembly language listing for each game and a Basic listing for all of you that don't have an assembler and just want to play the game. The machine language game in this issue is called "Titan Lander" and is Lunar Lander Type game for up to four players. Each of our games will try and keep you entertained for hours.

Another thing that we are starting next issue is disk and cassette subscriptions of ROM. These subscriptions will contain all of the programs in ROM plus a copy of the magazine. We know how frustrating it is to type in a program from a magazine and it doesn't run because of a stupid typing mistake.

We're encouraging our readers to write us letters and tell us what they think of the magazine and what we could do to improve it. We plan after the third issue to have full color and gloss throughout but that is a little expensive for right now. Also if any of you can write programs in Basic, Assembler, Pascal, or Forth we'd be glad to publish them. We pay well and give bonuses for really excellent programs.

That seems to be all, so happy programming and so long for now.

P.S. Rumour has it that Alan Alda star of *M*A*S*H* will be doing something else besides being in old reruns. He will be the Bill Cosby of the Atari computer. He will be helping promote the Atari with television commercials, etc. Way da go ATARI!



Starting Page

As we go along I will give some references of some books and magazine articles that will explain things in more detail. The numbers refer to the list of publications at the bottom of the page.

```
10 RAMTOP=106:CHBAS=756:CHORG=57344
20 GRAPHICS 0
```

```
30 RAMNEW=PEEK(RAMTOP)-8
```

```
40 START=RAMNEW*256
```

```
50 FOR CH=0 TO 1023
60 POKE START+CH,PEEK(CHORG+CH)
70 NEXT CH
```

Now that the character set has been copied down into this new area, we have to change a

```

116K MEM
EQUIP" D

```

Starting Page cont'd.

You may have wondered why we had to move the character set down in the first place. Well, the original character set is 'cast in silicon' in the Atari factory and is Read Only Memory. We have moved it into an area called Random Access Memory where we can actually change any of the set as desired.

In the next issue, we will modify some of the characters and place them on the screen in a pattern to form a picture. In the meantime, type in these lines (10 to 80), and then 'RUN' the program. If you get some funny results, such as the wrong letters coming up when typing, just push 'SYSTEM RESET' and then list and check your program.

REFERENCES:-

1. ATARI 400/800 BASIC REFERENCE
MANUAL.....P. 55
2".....".....P. 56
3".....".....APPEN. C
4".....".....APPEN. D
5".....".....APPEN. I
6. YOUR ATARI COMPUTER.P.291-29
7".....".....APPEN. F
8. DE RE ATARI.....CHAP.3,P.4-8
9. COMPUTE'S FIRST BOOK OF ATARI
GRAPHICS.....CHAP. 3

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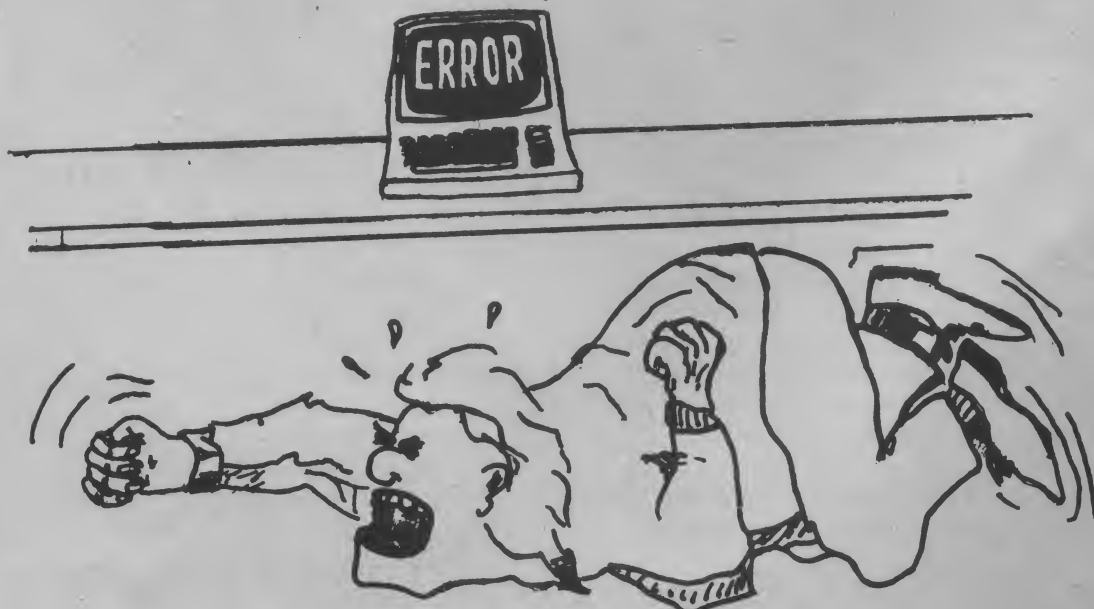
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The Raving Reviewer

by Tim Reekie

FLOYD OF THE JUNGLE

MicroProse Software

One Caribou Court

Parkton, Maryland 21120

\$29.95 Disk or Cassete; 32K

In the long list of Donkey-Kong like games, Atarians now have 'Floyd of the Jungle' by MicroProse Software. In this case however, Donkey Kong has been surpassed in at least two areas: 1-4 players can play simultaneously, and the background graphics are done exceptionally well.

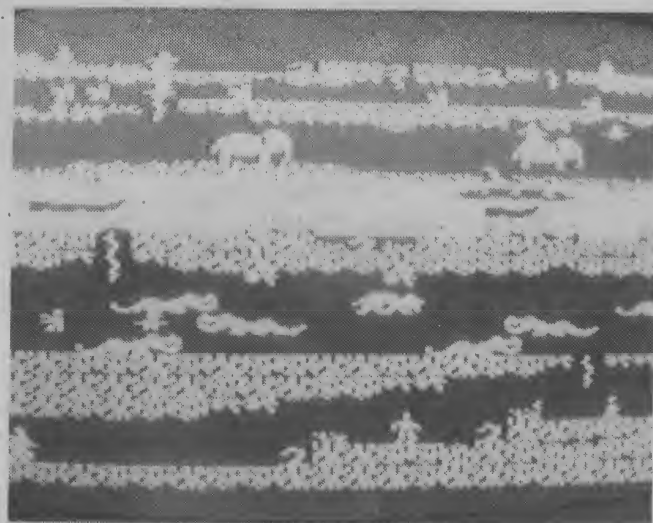
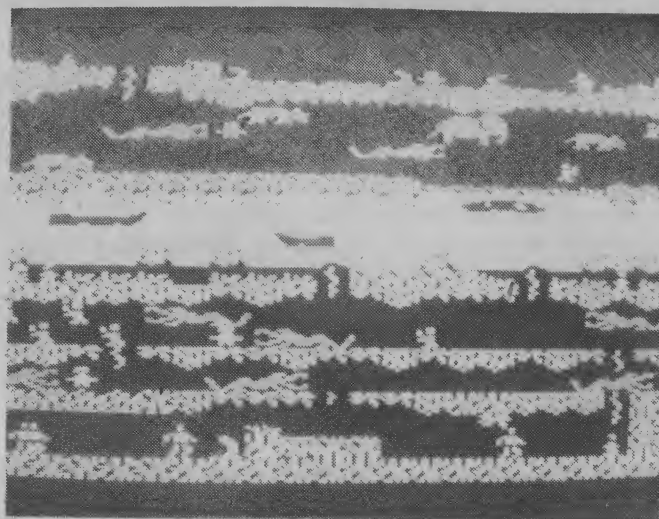
The Game

As I mentioned, Floyd of the Jungle can be played by 1-4 players simultaneously, with each Floyd capable of having a handicap(1 or 2 sore legs) for advance players. There are three difficulty levels: Easy, Medium, and Tough, and a playto value, that is set by the players, which automatically defaults to 20.

The object of the game is to rescue the fair maiden(that sounds familiar), Janice from nothing and no one in particular. To do so, our hero must jump snakes, ride alligators, elephants, and other miscellaneous animals, while avoiding getting eaten and or trampled by them. On two of the five different screens there is also a torrential river with canoes floating by for Floyd to jump on to.

And then, of course, are the Pygmies shooting poisoned darts at poor old Floyd. This is where the game gets comical. Floyd avoids the darts by jumping over them(push button) and can pick up two points by punching the Pygmy. Floyd gets his sustenance by catching birds(1 point each). The first Floyd to rescue Janice collects 4 points with additional points being added for traversing the course in less than 60 seconds and/or with a handicap.

Scores are displayed after each screen is completed, along with a table declaring the breakdown of points(birds, pygmies, rescues). The first person to earn the number of points selected receives a nice surprise.



THE RATINGS

Until the game is mastered, it is very frustrating, as every death returns your Floyd to the bottom of the screen. Even after the game is "mastered", the challenge is still very much present as you are now no longer racing

Raving Reviewer cont'd.

against the clock or trying to better your high scores, but you are now racing against someone who also knows the ropes (or in this case, the vines). One little mistake and...

At first some parts of the screen may seem impossible to pass, but experimentation and imagination will overcome these problems.

The graphics are incredible. So much seems to be crowded into such a small space. All over the screen, there is something happening. Before and after the game, the music is a superb three-part harmony, but during the game the sound is restricted to darts flying and Floyds dying. Personally, I had to stop and listen to discover that this was the case.

The instructions, besides being humorous, are quite informative, although for a while I was trying to punch the monkeys as they look similar to the pygmies. Experience sorts out these mistakes. This game has that lasting quality about it, with many innovative and downright funny ideas added for good measure.

FLOYD OF THE JUNGLE

Playability:9

Challenge:8.5

Graphics:10

Sound:9

Documentation:8

Overall Rating:9

Soccer

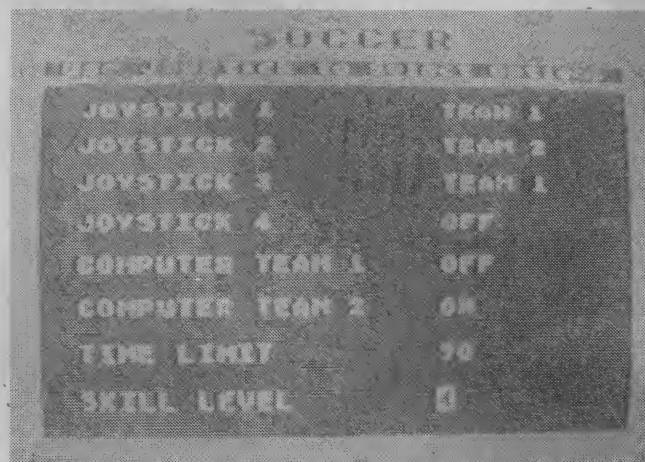
Thorn EMI

1370 Avenue of the Americas
New York, New York, 10019

Hello soccer fans, and welcome to another fine night of soccer in Maple Ridge. We will be joining our on-the-spot reporter after these few words about the game.

GAME

SOCCER can be played from 1-4 players, two computer players, and every conceivable combination of these players including computer Vs. computer. The time limit can be set as 10, 45, or 90 minutes. The computer also has 1-4 skill levels which only the computer uses. And now to our on-the-spot reporter in Maple Ridge.



ON THE SPOT

Good Evening, this is Coward Hosell, and welcome to my post game show.

Those two teams were really scrolling well out there today, although both seemed rather colorless. Those two players seemed to be all over the field (push button to become the nearest free player to ball). I came today expecting another of those unoriginal "sports" games, but instead found SOCCER to be a fast-paced challenging game. If you like Soccer, then you'll like SOCCER. From the turf at Thorn EMI stadium, this is Coward Hosell signing off.

Unfortunately, under this bed of roses, is

Continued on page 31

Display Lists

by Bob Cockroft

The display list is a program in your Atari computer that tells the Antic chip what and how to display information of the screen. One who has the ability to modify display lists has a much better understanding of graphics than one who does not. New graphic and text modes can be created or combined. Think of how your games could be improved. New and more interesting display lists could be used to enhance the graphics in a program.

Before I talk about display lists, you need to know how images are displayed on the screen. The television shoots an electron beam at the screen starting in the top left corner. This beam is moved horizontally until it reaches the right hand side of the screen where it moves down one vertical line. This process is repeated many times. These horizontal lines created by the beam are called scan lines. The Atari display has 192 of these scan lines located in the middle of the screen. By continually creating lower and lower horizontal lines the beam will eventually reach the bottom right corner where it is reset to the top left corner to enable a new screen to be drawn.

Before we have a look at the display list we need to find where it is. This can be easily accomplished by using the display list pointers.

```
ADDRESS=PEEK(560)+256*PEEK(561)
```

The variable 'ADDRESS' has the base (lowest) memory location of the display list. Now what we need is to have a peek at the entire display list (no pun intended). To do this you need to copy in the following program.

```
10 REM ***** PRINT OUT THE DISPLAY LIST
****
15 DIM DAT(176)
20 ? "THE DISPLY LIST OF WHICH GRAPHICS
MODE DO YOU WISH TO SEE?"
22 INPUT G
25 GRAPHICS G
30 DL=PEEK(560)+256*PEEK(561)
35 REM STORE DISPLY LIST IN AN ARRAY
40 FOR X=1 TO 176
52 DAT(X)=PEEK(X+DL-1)
```

```
50 NEXT X
55 REM PRINT ARRAY ON THE SCREEN
60 GRAPHICS 0
70 FOR X=1 TO 176
75 PRINT DAT(X);? ";";
80 NEXT X
```

If you had correctly copied and ran the preceding program, there would be a list of numbers on the screen. This group of numbers is the display list. It is important to note that the long list of zeros at the end of some of the display lists, play no role. If you ran the program a number of times using different graphic modes, you would have probably noticed that the display list changes everytime the graphic mode changes. Although each graphic mode has its own unique display list, there is a common format you can follow. (It may be helpful to refer to table 1 (an example display list) during the following discussion.

At the beginning of the list you will see 3 bytes which have the value '112'. These bytes create 24 blank scan lines at the top of the screen. The purpose of these is to move the display list to a readable location on the screen.

The next byte down the list, the LMS (the number in this location is in the area of 70). This is a 3 byte instruction which tells the Antic chip where to display the screen data.

The first byte tells the computer this is the LMS instruction and what graphic mode number to expect. The number generated in this byte is equal to the instruction register mode line number plus 64.

(the (IR) mode line number for graphics 2 is 7)

$7+64=71$

The (IR) mode line number is a number that the Antic uses to designate a particular graphics mode. This number does not correspond with the basic's graphic mode number. For example, the (IR) mode line number of graphic mode 8 is 15. Refer to table 2 for the (IR) mode line number for each graphic mode.

The second and third bytes are in the

Display Lists cont'd.

LSB/MSB form and give the address where the Antic will be jumped to in order to repeat or continue the list. By changing the values in these two locations, the screen can be scrolled in all directions. However, scrolling will not be discussed in this article because it has been already covered in a separate article in this same magazine(refer to magazine index).

The display list that is given to you in table 1, contains a line list of 7's. These 7's are the (IR) mode lines. Each byte you see containing a (IR) mode number represents one horizontal line of that graphic mode the number represents. The first (IR) mode number stands for the highest line of graphics on the screen. The following (IR) numbers represent horizontal lines of graphics which are progressively lower. As you remember each graphic mode has its own particular (IR) mode number. By replacing any or all the (IR) mode numbers with (IR) mode numbers of a different graphic mode, the horizontal line which is controlled by the altered number is changed to the new graphic mode. In other words by altering the (IR) mode numbers you can change any horizontal line on the screen to any graphic mode you like.

Immediately after the row of (IR) mode numbers is another LMS instruction. The value in this byte varies with graphic modes the same way the previous LMS instruction did. In the example given to you in table 2, '64' is added to '2', the (IR) mode number for graphics 0,

Therefore $2+64=66$

Like the previous LMS instruction the two following bytes represent the address where the Antic chip will jump to, to draw the screen.

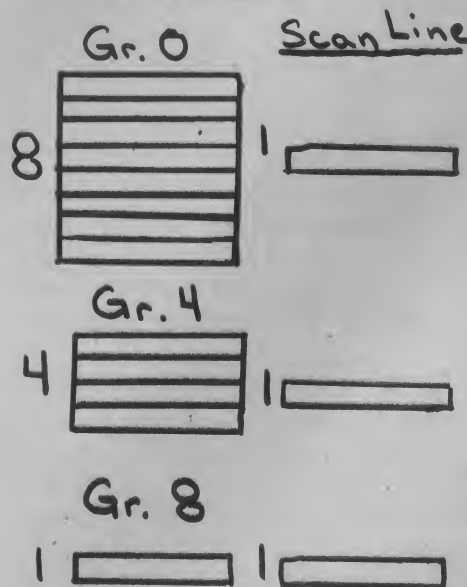
The following group of 2's are the (IR) mode numbers for graphic mode 0. These numbers create the block of text graphics at the bottom of the screen.

The last instruction begins immediately after the 2's(note!in table 1 example this byte appears as a 65). This is another jump instruction. The first byte prepares the Antic for the jump and the last two locations give the destination. After the Antic goes through the display list, thus drawing the graphic

mode, it is then reset by this instruction. In other words, these bytes force the Antic to draw the graphic mode repeatedly. Therefore, the second to last byte should equal PEEK(560) and the last byte PEEK(561), the starting address of the display list.

I have now gone through the format of the display list. It is time to use this knowledge in a practical application

Do you remember the scan lines? (Those lines created by the electron beam). The important thing is that there are 192 of them no matter which graphic mode you are in. With that in mind, it is time to understand how to use (IR) mode lines. Everytime you select a graphic mode, knowing it or not, you select a (IR) mode line. The higher the resolution of the graphic mode the larger the number of these (IR) mode lines. For example, graphic mode 8 has many times more (IR) mode lines than graphic mode 2. This is why graphics 8 is able to have higher resolution than graphics 2. Because graphics 2 and other low resolution graphics modes only use a few (IR) mode lines, each of these lines take up many scan lines. The diagram below displays the variations in size between different (IR) mode lines and scan lines:



Refer to table 2 for the numerical

Display Lists cont'd.

differences between (IR) mode lines and scan lines. It is important to remember that the screen only has 192 scan lines and that the total number of scan lines used, cannot exceed this number. It would not take many mode lines of a low resolution graphic mode to use all the available scan lines. For example, one (IR) mode line of graphic 2 would use 16 scan lines. Therefore the screen holds only 12 (IR) mode lines of graphic 2.

(Total scan lines=192; scan lines used for one (IR) line in graphics 2 =16)

Therefore $192/16=12$ (IR) mode lines

Similar calculations can be done for all the graphic modes. The important thing is that one must note the number of scan lines used for each (IR) mode line.

Enough of the theory; now it's time for some programs you can use. Let's say, for example that you wished to create a screen which was half in graphics 3 and half in graphics 4. You would try to make the display list look like this.

The following is a graphic mode which is split between mode 3 and mode 4:

```
112,112,112,72,112,  
158,8,8,8,8,8,8,8,  
9,9,9,9,9,9,9,9,9,9,  
9,9,9,9,9,9,9,  
66,96,159,2,2,2,65,78,158
```

It is important to notice that I have initially set the graphic mode to the first byte on the screen. With this modified graphic mode the top of the screen will appear in graphics 3 and the bottom is graphics 4 (note that the rows of 8's create graphic mode 3 and the 9's create graphic mode 4).

In the final program I will attempt to combine everything I have said. It will also provide you with a workable example in which to develop your own programs from. There is only one small item in this program which I have not mentioned to you yet. As you probably know graphic modes fall into two major categories: text and no-text modes.

The text modes are graphics mode 0,1, and 2. The non-text modes are all the rest. The importance of this is that the computer must be told how you wish your information to be displayed on the screen; in text or graphics. For example, if you were to attempt to input graphics 8 (IR) modes lines into a graphics 0 screen without letting the Antic know to change to a non-text mode during the graphics 8 section, you would not be able to draw in this graphics 8 area. To let the computer know how to display information on the screen, poke in address 87 and the graphic mode you will be using. For example, if you were to use graphics 5 then POKE 87,5. This technique is only necessary when you are changing from a text mode to a no-text mode or the reverse.

```
1 REM ** MODIFIED DISPLAY LIST  
PROGRAM 2 GRAPHICS 8:COLOR 1:OLOT  
100,100:DRAWTO 120,100  
3 DRAWTO 120,120:DRAWTO 100,120:DRAWTO  
100,100  
4 DIM B(200)  
5 C1=0  
6 B=PEEK(88)+256*PEEK(89)  
10 GRAPHICS 2+16  
12 COLOR 1  
20 DL=PEEK(560)+256*PEEK(561)  
25 REM GRAPHICS MODE 2  
30 C=DL+6  
40 POKE C,7  
45 C=C+1  
50 IF C1<4 THEN 40  
55 REM GRAPHICS MODE 8  
60 C1=0  
65 POKE C,15  
70 C=C+1  
72 C1=C1+1  
75 IF C1<80 THEN 65  
80 REM RESET LMS JUMP INSTRUCTION  
100 POKE C,65  
105 C=C+1  
110 POKE C,PEEK(560)  
115 C=C+1  
117 POKE C,PEEK(561)  
125 C2=0  
128 REM STORE DL VALUES IN AN ARRAY  
130 FOR L=DL TO C  
135 C2=C2+1
```


Display Lists cont'd.

```

140 B(C2)=PEEK(L0
150 NEXT L
155 REM PRINT RESULT OUT ON THE SCREEN
160 GRAPHICS 0
170 FOR WT=1 TO C2
175 PRINT B(WT);
180 PRINT ",";
190 NEXT WT

```

Table 1

The Display List for graphics mode 2

```

112 This instruction will place 8 blank
lines on the screen
112 8 blank lines
112 8 blank lines
71 First byte of the LMS (7+64)
112 This is the address of the first line of
screen data
158 Therefore:112+256*158=address
7 The following 7's are the (IR) mode
lines
7 Each (IR) mode line in this example
uses 16 scan lines(see table 2)
7 Therefor there is 160 scan lines use
7
7
7
7
7
7
66 LMS instruction with graphic(0) (IR)
number added
96 Starting address of the text window at
the bottom of the screen
159 96+256*159=address
2 Text window
2
2
65 This 3 byte instruction returns the
Antic to the top of the list
88 Address for the beginning of the
Display List
158 88+256*158=address

```

Table 2

Graphic mode statistics

Graphic(x) line	Type	No. of scan lines per mode
0	text	8
1	text	8
2	text	16
3	non-text	8
4	non-text	4
5	non-text	4
6	non-text	2
7	non-text	2
8	non-text	1

Graphic(x)	(IR) number	No. of mode lines
0	2	24
1	6	24
2	7	12
3	8	24
4	9	48
5	10	48
6	11	96
7	13	96
8	15	192

The Rating Scale

By Jake the Software Dude.

This table below is a reference sheet that can be referred to when reading the numbers given to each product review. It will help make clear why some of my numbers seem kind of low.

Rating Table

- 10-Totally original, outstanding.
- 9 -Excellent, show your girlfriend.
- 8 -Great, glad to have spent the money.
- 7 -Good, no complaints.
- 6 -Passable yet not to the programmer's potential.
- 5 -Passable, but dissapointing.
- 4 -Not worth the money.
- 3 -Don't show your friends.
- 2 -Don't show your mother.
- 1 -False advertising.
- 0 -Not recommended by the Surgeon General.

If there are any questions you can write to me in care of this magazine.

Jake The Software Dude

by Jason Cockroft

Aye readers, I'm Jake the Software Dude. I like to play games and play em ruff. My motto is, "if it's junk I'll give it the dump, if it's cool I'll let it rule." Some of the guys in my user gang say I have more braun than brains. So what if I go through a joystick every hour or if I have trouble using graphics mode 1. In the end I leave the computer smoking and the screen melting, with only the high score remaining!

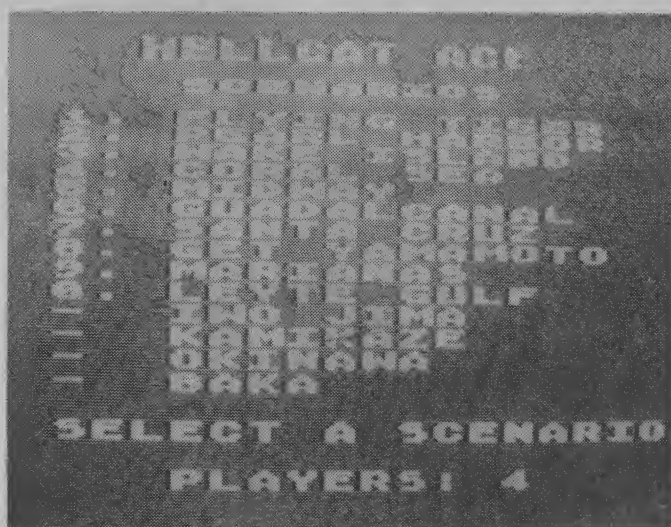
In my first review, I'm going to review Hellcat Ace, a wild and rugged game created by Sid Meier. If you're the type of guy who stays up all night watching W.W.II fighter flicks, like I do, you'll go wild on this game.

The basic layout of this game is based on you being a fighter pilot. You see what a W.W.II pilot in the Pacific would have seen! You see your power, ammo, heading, mirror, speed, and altitude gauges all on the console in front of you. But most impressive, which will burn your little eyeballs out, is the horizon. The reflection of the sun, and the changing color tones of the sky make the graphics, at least for the most parts, right on!

The basic format of the game allows the players to have a complete tour of the Pacific theater. You start as a Flying Tiger in August 1940 and hopefully finish with 5 kills or finish fighting in Okinawa in April 1945. In 14 different missions, you are asked to complete different tasks such as shoot down bombers, zeroes, scout planes, or avoid zeroes and even fight zeroes at night.

Gladly I find the game continually challenging and exciting. I find even after a month of continous practice,(I'm unemployed) I can only kill a zero 70% of the time and very rarely become an ace on skill level 3. Those intelligant zeroes dive, bank, weave and even climb into the sun. Sometimes they even challenge your skills by flying right down on the deck. The program justifiably makes the bombers and scout planes easier to shoot down than the zeroes. Meanwhile your own airplane can be damaged through his fire as you control your fighter with two jousticks; one of which you use to control your elevators and rudders and machine guns and the other to control your power and eject button. You can

even ditch your own aircraft when it is nearly totally destroyed. For you chicken type of pilots there is another option of bailing out. Yet even here you can be killed if your picked up by the Japanese ship.



Although the overall graphic presentation

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Yellow Brick Road

by Peter Ellison

In the last issue of ROM I showed how one can use the keyboard for input by PEEKing into the Atari's memory. In this issue I'm going to show you how easy it is to use the Console keys (The three yellow keys at the right side of the terminal). These keys are very useful for games, business programs, or whatever different selections need to be made. To set up this program we must first PEEK into the memory at 53279 decimal. This checks to see what special purpose key is being pressed. Below is a table that shows if PEEK(53279) equals that number then that key is being pressed.

Table 1

- 7=no key pressed
- 6=START key pressed
- 5=SELECT key pressed
- 4=SELECT and START keys pressed
- 3=OPTION key pressed
- 2=OPTION and SELECT keys pressed
- 1=OPTION and SELECT keys pressed
- 0=OPTION, SELECT, and START pressed

The program below checks to see what key is being pressed and then prints out what is being pressed.

```
10 A=PEEK(53279)
20 ON A+1 GOTO 25,30,35,40,45,50,55,60
25 ? "SELECT, OPTION, START":GOTO 10
30 ? "OPTION, SELECT      ":GOTO 10
35 ? "OPTION, START       ":GOTO 10
40 ? "OPTION              ":GOTO 10
45 ? "SELECT, START       ":GOTO 10
50 ? "SELECT              ":GOTO 10
55 ? "START               ":GOTO 10
60 ? "NONE                ":GOTO 10
```

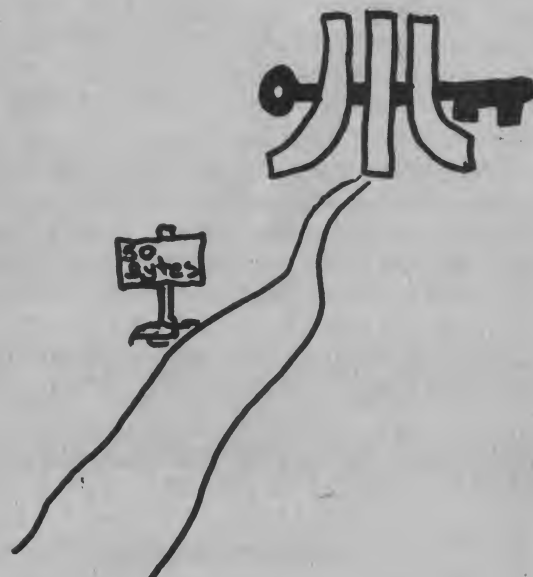
Remember next time you make a game or program that requires changing a level or number of players use the special purpose keys, their easy to use.

The second thing that will be discussed in this section is, "The Cursor". Yes, the little white thing that flashes on and off while you're typing in programs. This cursor can change color, blink, move, be positioned, and a whole lot more. Just by poking a number, each of these things can be done. For instance by typing POKE 752,1 you can turn the cursor

completely off. Below is a Table that shows the different things that can be done with the cursor.

<u>The Cursor</u>		
<u>NAME</u>	<u>DECIMAL</u>	<u>DESCRIPTION</u>
LMARGIN	82	Left Margin
RMARGIN	83	Right Margin
ROWCRS	84	Cursor Row
COLCRS	85	TAB
TXTROW	656	Cursor Row
TXTCOL	657	Cursor Column
CHACT	755	4=Vert, 2=Norm, 1=Blank
CRSINH	752	0=ON, 1=OFF
COLOR1	709	Color of Cursor

As you can see from the table above the cursor can be made to do just about anything by poking the right locations. The color of the cursor can be made lighter or darker by typing in POKE 709,X where X=0-255. Also by typing in POKE 755,4 all of the written text is displayed upside down. The cursor is a useful thing in programming when one knows how to use it. In the next issue of 'The Yellow Brick Road', player/missile graphics will be discussed with all of the locations needed to use them.



Game Reviews

Buried Bucks

Reviewed by Ed Snyders

ANALOG SOFTWARE

P.O. BOX 23

Worcester, MA 01603

If you like sensitive controls and fantastic explosions this game is for you.

You fly a helicopter, equipped with seventy-five rapid-fire bombs into an area where "the bucks" are buried underground. Your mission is to uncover the "bucks", pick them up, and bring them back to your home base. Don't let me deceive you, this game is harder than it looks. Buried Bucks is a game of speed and strategy. This is because as soon as you start blasting away at the ground a World War II bomber starts dropping dirt to replace the ground you have blown away.

The first two levels can be finished by speed and guts but from the third level on up you need a plan of action. Luckily the chopper is very responsive and quick, but still if the flack from your own explosion doesn't get you the bomber may. One other thing to watch out for in the ground, is the water. If at all possible keep clear of it. More often then not my tunnels and holes seem to be filled when I'm firing around water.

When you reach the fifth level you are given a new nemesis. Missile launchers that when land shoot fire balls at you. That along with all the dirt, flack and water make 'Buried Bucks' quite an experience. However the missile launchers can't land on uneven ground, so a quick spray of bombs back and forth across the screen should keep the majority of launchers from landing.

Remember you have to re-load in this game, the bullets don't last forever. This is usually when your holes start to get filled up. Your points which are represented by a dollar sign also decrease the longer you take to complete a level. This game is worth the money I paid for it and will keep me busy for hours to come.

Buried Bucks

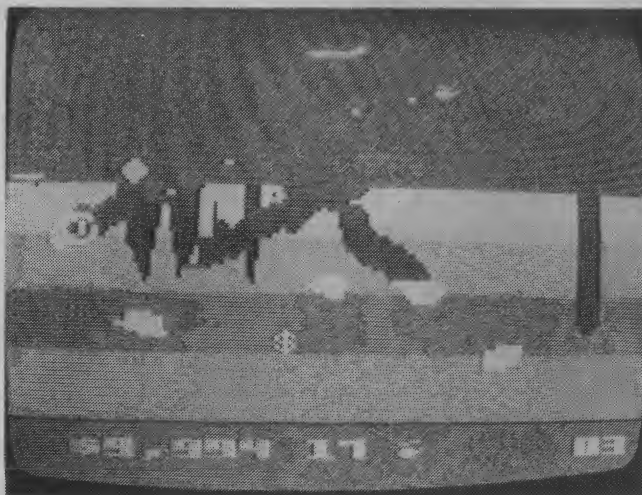
Challenge-9

Graphics-8

Sound-8.5

Documentation-8

Overall Rating-8.3



Meteor Storm

Reviewed by Peter Ellison

Royal Software

2160 W. 11th Ave.

Eugene, OR 97402

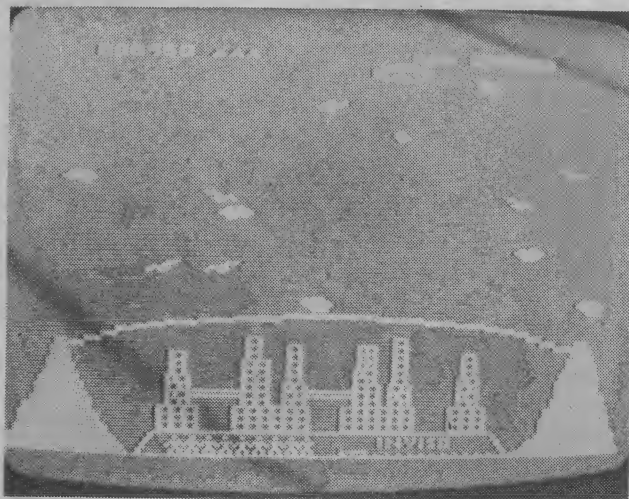
\$29.95 Disk or Cassete; 16K

You know this game is going to be great when the title screen appears and begins playing the theme from "Raiders of the Lost Ark" in four-part harmony. You can either listen to the whole song or press the start button to load in the game (Disk version).

A gigantic storm from space is approaching the planet Dracon at high speed. High above the planet's surface, a rescue ship waits helplessly, unable to penetrate the intense storm of meteor debris. You and your tiny fighter are the last hope for the people of Dracon. You must start from the docking bay of the rescue ship, maneuver your way down to the city below, avoid meteors and their debris, and touch down safely on one of the three landing bridges. After picking up the survivor, you must clear a path back up to the rescue ship and carefully dock (Be careful that you don't hit the rescue ship!). A transport shuttle will then pick up your survivor and take them

to safety. Your mission is completed when you have saved all of the people in the city.

Each city of Dracon has 10 survivors meaning to complete one level you must guide your tiny fighter down ten times. There is a shield over the city that is lowered every time your rescue ship nears the city. If you wait too long in getting out of the city with the survivor, you leave yourself vulnerable to a meteor hitting your city. If this happens 1000 points is deducted from your score.



Each piece of debris is a different color, making the game very pleasant to watch. The most notable thing about this game is the sound. A lot of games for the Atari have lousy sound because they have been translated from the Apple. This is not the case of this game. When leaving the rescue ship a rhythmic note begins to play. Then when landing in the city a little man makes a squealing noise as he waves his arms back and forth. The theme music from the movie "Superman" begins to play with the rhythmic note in the background.

When reaching the rescue ship with the survivor a nice little tune finishes the song off. The man is carried away and waves good-bye as he leaves.

There is a special feature called invisio that when the joystick is pulled back the ship

disappears making the debris pass through it. When leaving the city one can have the invisio on and continue to shoot lasers up and to both sides. The length of time the invisio can be held on increases after each survivor is rescued.

Meteor Storm is an excellent game but very difficult to master. It is said that if level ten is reached there is a special surprise (I can only reach level three). If you want a game that is very difficult, buy this.

METEOR STORM

Playability:8

Challenge:10

Graphics:8.2

Sound:9.5

Documentation:7

Overall Rating:8.1

The Battle of Shiloh

Strategic Simulations Inc.

465 Fairchild Drive, Suite 108,

Mountain View, CA 94043

"The Battle of Shiloh" by Strategic Simulations is a game that attempts to recreate this American Civil War battle. The stronger Confederate's force objective is to destroy the Union's army under General Grant before the North can reinforce and counter attack. Knowing that they have the advantage of surprise in the early stages of the game, the Confederate player must force his way through the Union defenders and take the Pittsburg landing, a dock on the Tennessee River, to prevent the Union reinforcements from crossing.

This game provides a refreshing change from the typical themes of most wargames. Unlike many wargames, the Battle of Shiloh has an exciting and clear theme. The Confederate player must take the Pittsburg landing and the Union player must prevent it. The army which is able to successfully obtain its goal greatly increases its chances of winning.

By allowing numerous attack strategies, this game provides a realistic approach to simulating this battle. The attacking side has four strategies to choose from ranging from all out attack to a more defensive recon. The defensive also has many strategies to choose

Game Reviews cont'd.

from: ranging from an aggressive counter-attack to a more defensive mode of retreat. This program was created with both the daring and conservative player in mind.

One of the best aspects of this game is its flexibility. One can be the union or the confederate playing against the computer or another player. The computer can even play against itself. In addition, there are multiple skill levels. Not only do the multiple skill settings make a provision for the varying abilities of players, but also increases the number of scenarios that can be created. An imbalance in military power can be created to produce different types of battle conditions.

This game unfortunately is a little slow. The whole process of moving the units seems to take too long. What causes this is units move individually and take too much time to make decisions. The problem is not as bad as I am making it sound. After all the computer

is still much faster than any human player I have seen. And maybe the human player needs the time to think anyway.

The graphics in this game are not excellent, but good. The background depicts the countryside around and including the Tennessee River. This background is both properly colored and reasonably detailed, showing hills, creeks, woods and fields. In addition, this battlefield scrolls horizontally. It is not a big battlefield, at least when compared with Eastern Front. However, this does not affect the game in a negative way. Being presented in the typical way, the units are presented as a square with an "x" in the center.

In conclusion, The Battle of Shiloh is a good war game. Its only real weakness would be the slowness of the computer's moving. It has good flexibility and is quite entertaining.

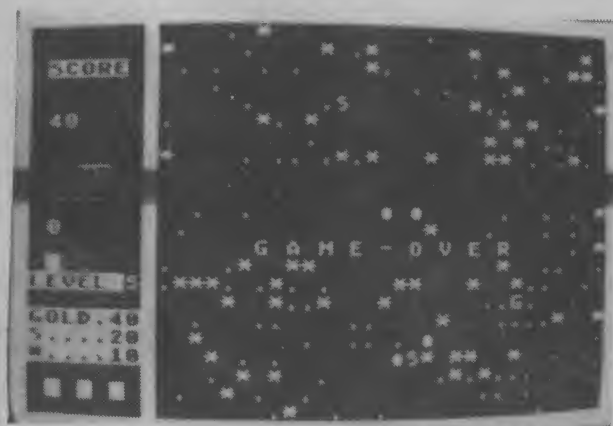


Star Bomb

by Toung Tran

The year is 2122 and you as the last star pilot must destroy each of the stars by using your plasma cannon mounted on the front of your space craft. While you're trying to destroy the stars one to five Alien space ships (Depending on level) try to crash into you, thus destroying one of your three lives. Unfortunately, you are unable to destroy these space ships because they have a special cloaking device which makes it impossible to hit them. The only thing that can be done is to avoid them. There are also different types of ore and minerals that can be picked up for valuable points. They are D-Diamonds, P-Plutonium, G-Gold, and S-Silver. These will appear randomly on the screen as the game progresses.

The game uses the Atari's character set to draw the space ships. These ships are poked onto the screen and then moved around through poking new positions. The ship moves with the joystick and fires by pushing the red button. The game takes about a minute to initialize as it randomly plots the different stars. Remember don't touch the stars.



```
10 DIM P$(3),A(5),X(5),Y(5),F(5),ROBOT(5)
:COLOR 2
20 SCREEN=PEEK(88)+256*PEEK(89)
30 GOTO 9000
39 REM---CONTROL-SHIPS---
40 S=STICK(0)
42 IF S=15 THEN RETURN
```

```
45 SOUND 0,150,10,10:POKE P,A(0):SOUND
0,0,0,0
50 IF S=13 THEN M=1:SHIP=87:F=40:GOSUB
300
60 IF S=14 THEN M=-1:SHIP=88:F=-40
:GOSUB 300
70 IF S=7 THEN M=1:SHIP=65:F=1:GOSUB 300
80 IF S=11 THEN M=-1:SHIP=68:F=-1:GOSUB
300
85 P=SCREEN+X+40*Y:A(0)=PEEK(P)
87 IF A(0)=84 THEN MAN=MAN-2:J=P:
GOSUB 5000:RETURN
88 IF A(0)<>0 AND A(0)<>14 THEN GOSUB 800
90 POKE P,SHIP:RETURN
99 REM ---INITIALIZE---
100 GOSUB 200
110 H=SCREEN+A+40*B
120 IF PEEK(H)=10 THEN FOR W=50 TO 100
130 IF PEEK(H)=14 THEN SOUND
0,20,10,10:POKE H,10:SOUND 0,0,0,0
140 IF INT(RND(0)*4)=1 AND PEEK(H)=0
THEN SOUND 0,100,10,10:POKE H,14:SOUND
0,0,0,0
150 RETURN
200 A=9+INT(RND(0)*30)
210 B=1+INT(RND(0)*22):RETURN
249 REM SET UP SHIPS
250 V=INT(RND(0)*20):ON V GOTO 270
,280,280,290,290,290,291,291,291,291
260 F(T)=10:RETURN
270 F(T)=36:RETURN
280 F(T)=48:RETURN
290 F(T)=39:RETURN
291 F(T)=51:RETURN
299 REM CHECK SHIP
300 IF PEEK(P+F)=128 THEN MAN=MAN-2:
J=P:GOSUB 5000:RETURN
310 IF PEEK(P+F)=10 THEN MAN=MAN-2:
POKE P+F,0:J=P:GOSUB 5000:RETURN
320 IF S=13 OR S=14 THEN Y=Y+M:RETURN
330 IF S=11 OR S=7 THEN X=X+M:RETURN
350 ? "G A M E - O V E R"
355 IF STRIG(0)<>0 THEN 355
360 ? "DO YOU WANT TO PLAY AGAIN
(Y/N)";:INPUT P$
365 IF SCORE>HI THEN HI=SCORE
370 IF P$="Y" OR P$="YES" THEN 30
380 IF P$="N" OR P$="NO" THEN END
390 GOTO 360
399 REM MOVE ALIEN SHIPS
400 T=T2+INT(RND(0)*(10-T1)):IF T>5 THEN
```

Star Bomb cont'd.

```

RETURN
403 POKE ROBOT(T),F(T)
405 IF Y(T)>Y THEN Y(T)=Y(T)-1
410 IF Y(T)<Y THEN Y(T)=Y(T)+1
420 IF X(T)>X THEN X(T)=X(T)-1
430 IF X(T)<X THEN X(T)=X(T)+1
435 IF X(T)<=8 OR X(T)>=39 OR Y(T)<=0 OR
Y(T)>=23 THEN 442
440 ROBOT(T)=SCREEN+X(T)+40*Y(T)
:F(T)=PEEK(ROBOT(T))
442 POKE ROBOT(T),84
445 IF F(T)=65 OR F(T)=68 OR F(T)=87 OR
F(T)=88 THEN MAN=MAN-2:J=P:F(T)=0:GOSUB
5000:RETURN
448 IF F(T)<>0 AND F(T)<>10 THEN GOSUB
8000
460 RETURN
469 REM KEEP SCORE
470 SETCOLOR 2,16,1:FOR W=1 TO 23:POKE
85,0:?" / " :NEXT W:?"
" (15 times) "
500 ? " (8 times) :?" "SCORE" :?" " :?" HI
(4 times) "SCORE" :?" HI
501 ? :POKE 85,1:?" "LEVEL " :LEVEL
502 ? :POKE 85,1:?" "D...100" :POKE 85,1:?"
" :POKE 85,1:?" "E...40"
503 POKE 85,1:?" "S...20"
504 POKE 85,1:?" " :?" " :?" " :?"
505 FOR W=1 TO 5 STEP 2:POKE SCREEN
+(1+W)+40*21,216:NEXT W
509 SETCOLOR 2,16,1:FOR W=0 TO 39:POKE
SCREEN+W,128:NEXT W
510 FOR W=0 TO 24:POKE SCREEN+40*W,
128:POKE SCREEN+8+40*W,128:POKE
SCREEN+40*W+39,128:NEXT W
520 FOR W=0 TO 39:POKE SCREEN+W+40*23
,128:NEXT W
600 FOR Y=1 TO 22:W1=9:W2=38:W3=1:IF
INT(Y/2)=Y/2 THEN W1=38:W2=9:W3=-1
605 FOR X=W1 TO W2 STEP W3:PI=0:IF
INT(RND(0)*(60-LEVEL*10))=2 THEN PI=10
610 IF INT(RND(0)*(30-LEVEL*5))=3 THEN
PI=14
620 POKE SCREEN+X+40*Y,PI:NEXT X:NEXT
Y
690 GOSUB 950:GOTO 9050
800 SOUND 0,48,10,10:IF A(0)=36 THEN
SCORE=SCORE+100
810 IF A(0)=48 THEN SCORE=SCORE+50
820 IF A(0)=39 THEN SCORE=SCORE+40

```

```

830 IF A(0)=51 THEN SCORE=SCORE+20
840 ? " " :SCORE:A(0)=0:RETURN
950 POKE SCREEN+(1+MAN)+40*21,128:
GOSUB 200:X=A:Y=B
960 SHIP=88:P=SCREEN+X+40*Y:FOR W=100
TO 50 STEP -1:SOUND 0,W,10,10:POKE
P,216:POKE P,88:NEXT W:SOUND 0,0,0,0
970 IF STICK(0)=15 THEN 970
980 POKE P,0:RETURN
3000 J=H:VER=40:HOR=1:O=0
3005 GOSUB 6000
3010 IF O=1 THEN RETURN
3020 IF O=2 THEN J=P2:MAN=MAN-2:
GOSUB 5000 :A(0)=0:RETURN
3080 GOTO 3005
5000 FOR W=40 TO 70:SOUND 0,W,12,12
:NEXT W:SOUND 0,0,0,0:COUNT=0:VER=40
:HOR=1:O=0:A(0)=0
5005 GOSUB 6000
5010 IF O=1 THEN 5040
5020 COUNT=COUNT+1:IF COUNT=3 THEN
5040
5030 GOTO 5005
5040 IF U=1 THEN RETURN
5050 IF MAN<1 THEN 350
5060 FOR Q=1 TO 200:NEXT Q
5070 GOSUB 950:RETURN
6000 POKE J,0
6005 A(1)=PEEK(J+VER):A(2)=PEEK(J-VER)
:A(3)=PEEK(J+HOR):A(4)=PEEK(J-HOR)
6020 POKE J+VER,76:POKE J-VER,76
6030 POKE J+HOR,76:POKE J-HOR,76
6040 IF A(1)=128 OR A(2)=128 OR A(3)=128
OR A(4)=128 THEN O=1
6041 IF A(1)=65 OR A(1)=68 OR A(1)=87 OR
A(1)=88 THEN O=2:P2=J+VER
6042 IF A(2)=65 OR A(2)=68 OR A(2)=87 OR
A(2)=88 THEN O=2:P2=J-VER
6043 IF A(3)=65 OR A(3)=68 OR A(3)=87 OR
A(3)=88 THEN O=2:P2=J+HOR
6044 IF A(4)=65 OR A(4)=68 OR A(4)=87 OR
A(4)=88 THEN O=2:P2=J-HOR
6050 POKE J+VER,A(1):POKE J-VER,A(2)
6060 POKE J+HOR,A(3):POKE J-HOR,A(4)
6070 VER=VER+40:HOR=HOR+1:RETURN
7000 IF PEEK(P)=87 THEN N=40:D=93
7010 IF PEEK(P)=88 THEN N=-40:D=92
7020 IF PEEK(P)=65 THEN N=1:D=95
7030 IF PEEK(P)=68 THEN N=-1:D=94
7035 C=1:P1=P
7040 A(5)=PEEK(P1+N*C):IF A(5)=128 OR

```

Star Bomb cont'd.

```

A(5)=84 THEN RETURN
7045 IF A(5)=10 THEN SCORE=SCORE+
10:J=P1+N*C:U=1:GOSUB 5000:U=0:? "↑
";SCORE:RETURN
7060 POKE P1+N*C,D
7066 IF C>2 THEN GOSUB 40:GOSUB 400
7070 POKE P1+N*C,A(5)
7080 C=C+1:GOTO 7040
8000 REM EXAMINE ALIEN
8010 IF F(T)=84 OR F(T)=92 OR F(T)=93 OR
F(T)=94 OR F(T)=95 OR F(T)=51 OR F(T)=39 OR
F(T)=36 OR F(T)=48 THEN F(T)=0
8020 IF F(T)=14 THEN GOSUB 250
8030 RETURN
9000 REM ---MAIN-PROGRAM---
9010 GRAPHICS 18:MAN=5:A(0)=0:
SCORE=0:LEVEL=1
9012 POSITION 4,1:? #6;"*star
bomb*":POSITION 4,10:? #6;"by toung tran"
#6;"by toung tran"
9013 POSITION 6,4:? #6;"LEVEL":POSITION
1,8:? #6;"PUSH START TO BEGIN"
☐ = Inverse Video Key

```

```

9014 POSITION 2,6:? #6;"SELECT FOR
LEVEL"
9015 POSITION 11,4:? #6;LEVEL
9016 L=PEEK(53279):IF L=7 THEN 9016
9017 IF L=5 THEN LEVEL=LEVEL+1:IF
LEVEL>5 THEN LEVEL=1
9018 IF L=6 THEN 9020
9019 GOTO 9015
9020 T1=10-LEVEL:T2=6-LEVEL:GRAPHICS
0:SETCOLOR 2,16,1
9030 IF LEVEL<=2 THEN T1=7-LEVEL
9040 FOR E=1 TO 5:GOSUB 200:X(E)=A
:Y(E)=B:ROBOT(E)=SCREEN+X(E)+40*Y(E)
:F(E)=0:NEXT E:GOTO 470
9050 GOSUB 40
9070 IF STRIG(0)=0 THEN FOR W=10 TO
20:SOUND 0,W,10,10:NEXT W:SOUND 0,0,0,0
:GOSUB 7000
9080 GOSUB 400:GOSUB 100
9100 GOSUB 400
9200 GOTO 9050

```



Display List Interrupts

by Bob Cockroft

Warning! It is recommended that reader should have a basic knowledge of display lists or have read the article in this magazine called 'DISPLAY LISTS' (see index).

Display list interrupts allows more colors to be presented on the screen. If you are a basic programmer, you have no doubt come across one of the main problems with graphics in basic, you cannot use more than four colors. But now with display list interrupts your problems are solved. By adding as many as 128 colors, your program displays can now be much more colorful.

As you already know, the display list is a program in the computer that is used by the Antic chip to display the screen. Although varying slightly with every graphic mode, the basic format remains constant. The display list's base address can be found by using location 560,561; the display list pointers

`BASE=PEEK(560)+256*PEEK(561)`

The first 3 bytes set the display list in a readable location on the screen. The next 3 bytes are the LMS. These bytes give the beginning address of where the screen data will be located. The following string of bytes are the ones we are interested in. Known as the instruction register (IR) mode bytes, these locations control the type of graphic mode that will be displayed. By each controlling an individual line of graphics, starting from the top to bottom, they are the largest single item on the display list. It is important to remember that the (IR) mode bytes both change in number and in the value contained in them with each graphic mode. The table below gives the value in the (IR) mode bytes with each graphic mode.

Table 1

Graphic mode	Value in (IR) mode byte
0	2
1	6
2	7
3	8
4	9
5	10
6	11
7	13
8	15

In this first article, in a series on display list interrupts, I will create a program using the Basic 'COLOR' command that will draw 3 colors on the screen. In addition, using display list interrupts, I will create one extra color by dividing the screen with color into 2 sections. Therefore I will have created 5 different colors on the screen; one more than the maximum for this graphic mode.

There are four steps to do to create a display list interrupt. First we want to determine where on the vertical plane we want to divide the screen with color. Remembering that each (IR) mode byte represents one line of graphics from top to bottom, one is able to find his desired dividing point by counting down the (IR) list the number of graphic lines before the point where you want the division. After this, all we need to do is add 128 to this (IR) byte to tell the computer to interrupt. For example, if the dividing point was to be in the middle, the programmer would need to add 128 to the middle (IR) byte.

The second thing we need to do is make a subroutine that tells the computer what to do during the interrupt. The subroutine I will create will be in machine language and will start at 1536(DEC). But before we are able to create this subroutine there are a few things you need to know about color registers.

There are two different types of registers for color creation in the Atari computer; Hardware registers and shadow registers. Hardware registers are 'write only' locations. In other words, if a command was given to read these locations, only zero's would be outputted. Hardware registers are updated by the value in their corresponding shadow register everytime the Antic draws a screen. Unlike the hardware registers the shadow registers can be both read from and written to. Below is a table of the hardware registers and corresponding shadow registers.

Table 2

COLOR	HARDWARE REGISTER	SHADOW REGISTER
COLOR 1	53271	709
COLOR 2	53272	710

COLOR 3 53273 711
BACKGROUND 53274 712

The following machine language subroutine will change the color of the background before the end of the screen by modifying the background hardware register before the shadow register can update it. In other words, we have changed the background color before the Antic has completed drawing the screen.

Machine Language Subroutine

Mem.	Loc	Value	Assembly	Comment
1536	72		PHA ;PUSH 'A' ON THE STACK	
1537	169		LDA ;LOAD 'A'	
1538	1		#1 ;WITH ANY NO.	
1539	141		STA ;AVOID CHANGE	
1540	10		\$0A ;IN MIDDLE OF	
1541	212		\$D4 ;LINE	
1542	169		LDA ;LOAD 'A'	
1543	50		#50 ;WITH NEW COLOR	
1544	141		STA ;STORE NEW COL.	
1545	26		\$1A ;IN HARDWARE	
1546	208		\$D0 ;REGISTER	
1547	104		PLA ;REPLACE 'A'	
1548	64		RTS ;RETURN	

The third thing we need to do is tell the computer where to jump after the interrupt. As you probably remember in step one we added 128 to one of the (IR) mode bytes of our choosing. Therefore forcing an interrupt when the Antic crossed this modified byte. Now we must tell the computer where to jump to in order to make the necessary changes in the color registers. The destination of our jump will be the machine language subroutine we created. Remembering that the beginning location of the subroutine is 1536 (\$600 hex), we POKE this location into the address 512,513 dec. When an interrupt occurs, the computer looks at location 512,513 and jumps to that address they contain. It is important to note that the address stored in 512,513 is in LSB/MSB form. (Therefore 1536 decimal would be as '0' and '6'). (see below)

1536/256=6
Therefore:

POKE 512,0;POKE 513,6

The fourth and last step would be to enable a Non-maskable interrupt(NMI). This can simply be done by POKEing 54286 dec. with 192

The program below contains all the steps I have mentioned. It should help you in future programs of your own. It is important to note that only the bottom half of the screen is colored by Display List Interrupts. The blocks of color that will be seen have been created by the Basic's COLOR comand. By using a joystick, the number placed into the hardware register can be changed. Look at the bottom left corner of the screen for the value in the Hardware register.

```

2 REM **** DISPLAY LIST INTERRUPT ****
5 REM LOAD IN MACHINE SUBROUTINE
10 FOR X=1536 TO 1536+12
15 READ D
20 POKE X,D
30 NEXT X
35 REM LOAD LOCATION FOR THE
  INTERRUPTS JUMP
40 POKE 512,0;POKE 513,6
50 GRAPHICS 5
60 DL=PEEK(560)+256*PEEK(561)
65 REM ADD 128 TO INTERRUPT BYTE
70 POKE DL+24,10+128
75 REM DRAW COLORED BLOCKS
80 COLOR 1
82 FOR C1=10 TO 20;FOR C1Y=10 TO 20
84 PLOT C1,C1Y;NEXT C1Y;NEXT C1
90 COLOR 2
92 FOR C2=40 TO 50;FOR C2Y=10 TO 20
94 PLOT C2,C2Y;NEXT C2Y;NEXT C2
100 COLOR 3
102 FOR C3=10 TO 20;FOR C3Y=30 TO 40
104 PLOT C3,C3Y;NEXT C3Y;NEXT C3
195 REM ENABLE (NMI)
200 POKE 54286,192
295 REM CHANGE VALUE PLACED IN
  HARDWARE REGISTER
300 IF STICK(0)=11 AND P<255 THEN P=P+1
310 IF STICK(0)=7 AND P>0 THEN P=P-1
320 POKE 1543,P
330 PRINT P
340 GOTO 300
500 DATA 72,169,1,141,10,212,169
510 DATA 6,141,26,208,104,64

```

Books on the Shelf

by Peter Ellison

This is a new column in the magazine that will be devoted entirely to reviewing books made to enhance the Atari. Each issue I will review two or more books that are new to the market. Sometimes old books will be reviewed for those unfamiliar with them. In this very first article, three books from Elcomp will be reviewed. Remember if your company has any new Atari books on the market don't be afraid to send them in.

Games For The Atari

The cover of this book is very deceiving because it reads "Games for the Atari". A person who doesn't look inside might think its just a bunch of games, but if you turn to the front page of this book it then reads "or How to program your own games" which makes more sense. That is what this book is all about, "How to make games on the Atari."

Although it doesn't teach any machine language, it does have a machine language program in which you can type in. There are seven teaching sections which include "Player missile movement in machine language" and "Programming the Joystick". There are ten games that can be typed in and then played. These basic games vary from "Backgammon", which I liked the most, to "Gunfight", which must be type in with a machine language monitor.

Then at the back of the book is an Appendix that gives all the memory locations needed to use player missile graphics in basic. There is also a section called "Antic" which gives a little insight to how this microprocessor works. Character graphics are also discussed in a short section and so are display lists. This book contains everything needed to become an excellent game programmer in basic.

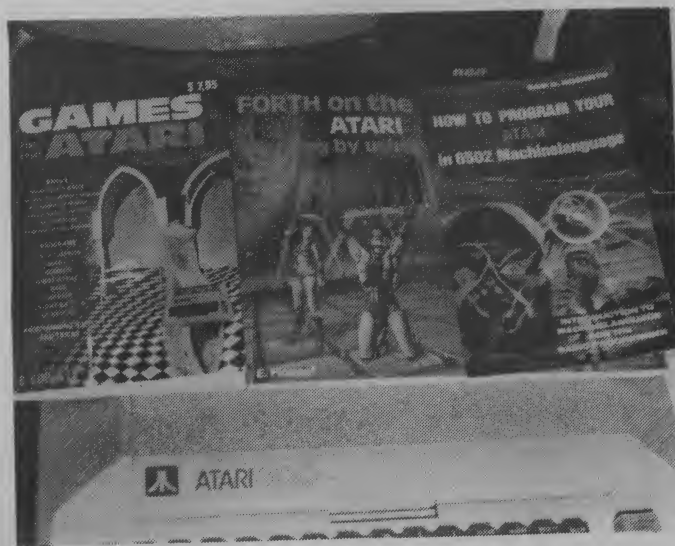
The documentation of the programs is good helping a new programmer understand why and how the program works. In my opinion \$7.95 is a very low price for this very valuable book. This book is a must for anyone who has just bought an Atari computer.

How To Program Your Atari in 6502 Machinelanguage

This book is another fine book from Elcomp. This book helps to ease a basic programmer into the world of machine language. The author does this by first showing what the program would look like in basic and then gives the listing for it in machine language. For this book it is very important that you have either the Assembler Editor Cartridge from Atari or the ATAS-1 or ATMAS-1 from Elcomp. The book shows the differences of the three assemblers.

The book includes many useful machine language utilities such as a "Random Number Generator" required for many games like dice-games, mazesgames, etc. In the second chapter a programming model of 6502 CPU is given to help a Basic programmer begin to understand machine language. Another useful program is one that enables you to access the character set. The author takes for granted what you already know in basic and tries to use this to help you understand machine language.

This book isn't over the head of most people as many books on machine language are. This is why many people give up trying to learn how to program in machine language, but this book with some practice should help more people understand what goes on inside the Atari.



Books on the Shelf cont'd.

Forth on th ATARI

For the growing number of avid Atari owners buying Forth compilers, books like this one are a god-send. The cover is a little misleading as it shows a half-naked lady standing beside a man holding a rock with "Forth" carved on it. The art work is well done but may offend some people.

Enough about the cover. It isn't the cover most people buy books for. Inside the front cover is the table of contents ranging from chapter one(What is Forth?) to chapter nine(Appendix). The book starts out as if you have never used Forth before and gives a very thorough explanation of it. The book includes photographs and pictures to help enhance the reader's understanding of the material. The writing is also very clear as the author makes the topic easy to understand.

The thing about this book that makes it better than most Forth books is that it is directed specifically to the Atari and all of its special features. Chapter five is called "Sample Programs" where it gives several programs and definitions of words that are available in Forth. With this book being devoted to the Atari it gives very helpful programs such as using a graphic mode or programming a joystick routine. The programs are very helpful because no other Forth book would give them. If your reference manual that was received with your Forth didn't give them then you were out of luck.

This booklet besides being an excellent teacher of Forth gives a mailing list program, written in Forth, that can be used right after typing it in. The only thing wrong with this program is the printer has to be accessed through the third joystick port by making up a little aparatus. I know this could be a bother for some.

I recommend this book to anyone who is interested in Forth and would like to get a head start on it. Elcomp has a free catalog that they will send out to anyone interested in their books or products. The address is given below:

Elcomp Publishing, Inc.
53 Redrock Lane
Pomona, CA 91766

Chart Maker

by Young Tran

This program below is a graphing program that uses Atari's special character set to make the graph around the bars in the chart. The program first asks the user to input how long, or number of time. Next it asks how big you want the unit to be per block. This program can also be used by changing the letters to horses or numbers and make a gambling game.

[illegible]

A = CTRL A

Interview: Scott Adams

Interviewed by Peter Ellison

Adventure International has been in the software business for over five years now and has recently become very involved with the Atari market. They also make software that is available for the Trs-80, Apple, Texas Instruments, Northstar, and IBM. I think this wide selection of computers shows the versatility of the company. Many of the new programs for the Atari include Airline (a colorful game of high finance and corporate affairs), S.A.G.E. (Scott Adams' Graphic Editor), and The Disassembler (Compatible with most of the assemblers on the market).

Q. Scott, when did you first become interested in computers?

A. It was back in grade 3 at a science fair when I saw an IBM computer behind some glass. We were told not to go behind the glass. It was then that I wanted to be one of those people behind that glass.

Q. When did you start Adventure International?

A. I started Adventure International in 1978.

Q. How difficult was it to transfer your programs from the Apple to the Atari?

A. It was fairly easy to transfer programs from the Apple to the Atari as I have a Bachelor of Science in computers.

Q. Do you plan to use a voice synthesizer in any of your new adventure games?

A. Well we're supporting for the Atari and the Apple, the Blowtrack synthesizer and similar ones like it.

Q. Did you begin working out of an office or out of your home?

A. I started in a small bedroom which I used for my office.

Q. How big is your office at this time?

A. Over 11,000 square feet.

Q. Where do you get all of your ideas for an adventure?

A. Same way novelists or artists get their ideas, they just come.

Q. What type of theme do you like to dwell on best?

A. I don't have any preferences, I just enjoy writing adventures. At heart a frustrated writer, always wanting to write books. A tremendous avid reader I have

thousands of books in my personal library and adventures have turned out to be my creative outlet.

Q. How long on the average does it take you to write one of your adventure games?

A. A couple of months.

Q. Now that Adventure International has grown so greatly in the last year, do you have time to oversee all your new software programmers?

A. I try to for sure.

Q. How many programmers do you have working for you at this time?

A. We're basically a publishing house for freelance authors and we have over 60 authors worldwide.

Q. What do you do when you are not programming?

A. Well running the business, in itself, is a full time job. I've got two kids that I spend a lot of time with. I don't seem to have a lot of free time. I'm either programming at the office or playing with the kids.

Q. What kind of deal do you offer to an outside programmer, such as Russ Wetmore, author of Preppie?

A. A very attractive one. We have a standard author pack we're glad to send to anyone that is interested in becoming a software programmer.

Q. What age group are your programs directed to?

A. From preschoolers on up. We try to find something for everybody.

Q. Do you ever use suggestions from letters and incorporate them into your own programs?

A. Usually not although somebody will come along and find a bug in a program and suggest a modification.

Q. Do you plan to make use of the new Atari 1200XL?

A. Right now we haven't, but you never know what the future will bring. Our biggest thing right now is making sure our current programs are compatible with the 1200. There are problems with that and we have just about got that licked. One main reason we haven't brought out programs specifically for the new 1200 is because so far it's not selling as well as the 400.

Continued on page 31

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Scrolling Your Atari

by Bob Cockroft

In order to allow the screen to scroll horizontally one must find the starting address of the display list. This address is located in memory location 560,561 (230,231 hex)(symbol:SDLSTL). It is important to note that the starting address of the display list is using the LSB/MSB system. What this means is that the 560 represents the least significant bit of the display list address and the 561 the most significant bite. Therefore to get the correct address you must multiple the most significant bite by 256 and add to this the least significant bite.(see below)

```
ADDRESS=PEEK(560)+256*PEEK(561)
```

What we have now is only the starting address of the display list. What we need now is the rest of the value composing the display list. The remaining values are located in the higher locations immediately following the starting address of the display list. A complete picture of the display list can be easily found by copying and running the following program

```
REM **** PRESENT DISPLAY LIST ON  
SCREEN (GR,2) ***
```

```
10 DIM DL(200)  
20 FINISH=176  
30 GRAPHICS 2  
40 DIS=PEEK(560)+256*PEEK(561)  
50 COUNT=1  
60 DL(COUNT)=PEEK(DIS+COUNT-1)  
70 COUNT=COUNT+1  
80 IF COUNT<=FINISH THEN 60  
90 GRAPHICS 0  
100 FOR C2=1 TO FINISH  
110 PRINT DL(C2);";";  
120 NEXT C2  
140 END
```

The display list values vary both in length and content with the graphic mode. Its main purpose is to tell the ANTIC chip what to display on the screen. But in this article, however, we will only concentrate on locations relative to scrolling. We will first attempt to understand the principles of horizontal

scrolling then later move onto vertical scrolling

In order for us to begin to create a program that will scroll horizontally we must first locate the LMS instruction. The LMS is an 3 byte instruction that tells the ANTIC chip which address to jump to in order to repeat or continue the display list. This instruction is located 3 bytes after the display list base address. If you look at the top of the list given to by the above program you will notice that 3 has a value of 112 and then a value of 71. This 71 is the first byte of the LMS(note: this value 71 will change slightly with different graphics modes). The first byte of this instruction prepares the computer to jump. The second and third bytes is the address that it will jump to(note: this address is in LSB/MSB form).

Horizontally scrolling is done by incrementing or decrementing the value in the least significant byte of the LMS. This least significant byte is located immediately AFTER the first byte of the LMS and appears as a 112 in the list. At this point it is best for you to copy in the following program(note: the least significant byte being used to horizontal scroll is equal to the display list base address plus 4 (DL+4)).

```
REM **** HORIZONTAL SCROLLING ****  
10 GR.7  
12 COLOR 1  
14 SETCOLOR 2,16,1  
15 REM ** DRAW FIGURE **  
20 PLOT 40,20:DRAWTO 40,60:DRAWTO  
65,60  
25 DRAWTO 65,20:DRAWTO 40,20  
30 DL=PEEK(560)+256*PEEK(561)  
40 LSB=DL+4  
45 B=PEEK(LSB)  
50 IF STICK(0)=11 THEN B=B+1  
60 IF STICK(0)=7 THEN B=B-1  
79 REM ** POKE NEW VALUES**  
70 POKE LSB,B  
80 GOTO 50
```

If the above program was copied out correctly you now have seen the block move across the screen. careful observation will reveal if one moves the block in one direction

Scrolling Your Atari cont'd.

for a long period, the figure slowly moves up or down. This effect is a result of the fact that the screen is stored as one long row of bytes starting from the top left corner and moves horizontally in line until it reaches the lower right hand corner. Therefore when one changes the least significant byte by 40 the screen is scrolled vertically by one byte (note: this is a 40 character screen). You have just discovered vertical scrolling! Before you start celebrating it is best I tell you about a few complications I have not yet mentioned. It is true by just incrementing or decrementing the least significant byte of the LMS you can scroll vertically, but not very far. This limitation became very obvious with only a little thought. After all, when you must add 40 every time you want to move vertically to a byte that can only hold a value between 0 and 255, it seems obvious you are not moving very far. However, there is a way to solve this. Remember the LMS's MOST SIGNIFICANT BYTE, the one following the least significant byte, (note: the value on the display list program was 158) by changing this we will end the problems. Every time the Least Significant Byte goes below 0 and 256 to the LSB to reset it and subtract 1 from the Most Significant byte. By doing this, the LMS pointer is increased by 256 bytes.

You must also subtract 256 from the LSB and add 1 to the MSB every time the LSB goes above 255. After all this is done the new MSB and LSB value must be poked into their respective locations. If you are still confused or perhaps want to practice what you have learned, copy in the following program. It is designed to scroll both vertically and horizontally.

```
10 REM **VERT & HOR SCROLLING **
12 GR. 6
14 COLOR 1
15 SE 2,16,1
18 REM *DRAW FIGURE
20 PLOT 40,20:DRAWTO 40,60:DRAWTO
65,60
22 DRAWTO 65,20:DRAWTO 40,20
30 DL=PEEK(560)+256*PEEK(561)
40 LSB=DL+4
50 MSB=DL+5
```

```
60 BL=PEEK(LSB)
70 BM=PEEK(MSB)
79 REM *CHANGE VALUES*
80 IF STICK(0)=14 THEN BL=BL+40
85 IF STICK(0)=13 THEN BL=BL-40
90 IF STICK(0)=11 THEN BL=BL+1
95 IF STICK(0)=7 THEN BL=BL-1
100 IF BL<0 THEN BM=BM-1:BL=BL+256
110 IF BL>255 THEN BM=BM+1:BL=BL-256
180 IF BM<0 OR BM>255 THEN 80
199 REM *POKE NEW VALUES
200 POKE LSB,BL
210 POKE MSB,BM
220 GOTO 80
```

After running this program you may have noticed ghost images when moving vertically. Nothing can be done about this in basic. They result from the slowness of the basic and can only be eliminated by a faster language.

This article has not revealed all that can be revealed about scrolling, nor was it intended to. What I have tried to do is provided a simple and hopefully practical introduction to this useful technique. HAPPY SCROLLING!

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Adventure Games - Part II

by Peter Ellison

Last issue 'Black Knight' was set up just by the designing of the castle on paper. In this issue brave Sir Lancelot will be created using player missile graphics. Also some creatures such as a dragon and a giant will also be made.

Lancelot since he is wearing Chain-mail armour will only be able to move eight spaces per move. This will be done in the final installment by having a machine language subroutine check the joystick each time and turn it off after one space has been made. This is very similar to the movement of Ali Baba(TM) which is an excellent system for any adventure. Last issue I said that was going to show you how to make the castle using data statements, instead I'm going to show a few of the characters that will be used in the final program. I decided to do it this way so that the entire program would be in the third and final installment. This is so a person wouldn't be forced to buy back copies of the magazine.

The first character is one of a dragon. The listing below will draw a yellow dragon on the screen by using four players to do this. Coming from his mouth is a red tongue. By using the four players, larger characters can be created, and as you will see in the next issue, moved. Type in the program listing below.

Dragon

```
45 REM SET UP PLAYER/MISSILE BASE
50 I=PEEK(106)-8:POKE 54279,I
55 REM PLAYERS 0 AND 1
60 J=I*256+516:X=I*256+644
65 REM PLAYERS 2 AND 3
70 L=I*256+768:M=I*256+896
95 GRAPHICS 2
100 SETCOLOR 2,11,6
105 COLOR 3
200 POKE 559,46
209 REM PLAYER 0
210 POKE J+1,0:POKE J+2,0
220 POKE J+3,1:POKE J+4,128:POKE
J+5,252:POKE J+6,128
229 REM PLAYER 1
230 POKE K+1,1:POKE K+2,3:POKE
K+3,2:POKE K+4,63:POKE K+5,3:POKE K+6,63
239 REM PLAYER 2
240 POKE L+4,128:POKE L+5,128:POKE
```

```
L+6,128:POKE L+7,128:POKE L+8,131:POKE
L+9,207
```

```
245 POKE L+10,255:POKE L+11,127:POKE
L+12,63:POKE L+13,31:POKE L+14,12:POKE
L+15,60:POKE L+16,240
```

```
249 REM PLAYER 3
```

```
250 POKE M+7,192:POKE M+8,240:POKE
M+9,240:POKE M+10,248:POKE
M+11,248:POKE M+12,252:POKE
M+13,240:POKE M+14,60
```

```
255 POKE M+15,12:POKE M+16,15
```

```
475 REM DRAGON'S COLOR
```

```
480 POKE 704,50:POKE 705,41:POKE
706,43:POKE 707,43
```

```
483 REM DRAGON POSITION
```

```
485 DRAGON=100
```

```
490 DPOS=DRAGON
```

```
510 POKE 53277,3
```

```
1229 REM POKE DRAGON TO SCREEN
```

```
1230 POKE 53248,DPOS:POKE
53249,DPOS:POKE 53250,DPOS+8:POKE
53251,DPOS+16
```

Since only one monster will be moving at a time it is easy to use four players for one monster. Below is the character data for four other creatures, one of them being poor Lancelot. By deleting lines 209-255 from the above program just the few lines can be added to show the images of the other characters in the game. Below is Lancelot.

Lancelot

```
210 POKE J+1,56:POKE J+2,68
```

```
220 POKE J+3,130:POKE J+4,130:POKE
J+5,84:POKE J+6,56:POKE J+7,16:POKE
J+8,56:POKE J+9,16:POKE J+10,16
```

```
225 POKE J+11,40:POKE J+12,68
```

```
230 POKE K+1,0:POKE K+2,0:POKE
K+3,40:POKE K+4,0:POKE K+5,16:POKE
K+6,0:POKE K+7,0:POKE K+8,0
```

The next monster is one of a giant. This giant has a club in his hand in order to add to the graphics. To have the giant's club in the right position POKE 53250,DPOS+8 must be changed to POKE 53250,DPOS-8.

Giant

```
209 REM PLAYER 0
```

```
210 POKE J+1,62:POKE J+2,42
```

```
220 POKE J+3,54:POKE J+4,62:POKE
J+5,8:POKE J+6,62:POKE J+7,28:POKE
J+8,28:POKE J+9,128:POKE J+10,28:POKE
J+11,28
```


Adventure Games - Part II cont'd.

225 POKE J+12,20:POKE J+13,20:POKE J+14,20:POKE J+15,20:POKE J+16,54

229 REM PLAYER 1

230 POKE K+2,20:POKE K+3,8:POKE K+6,65:POKE K+7,193:POKE K+8,194:POKE K+9,252:POKE K+10,64:POKE K+11,64

235 POKE K+12,64

239 REM PLAYER 2

240 POKE L+8,6:POKE L+9,7:POKE L+10,3:POKE L+11,1

The last two are that of a wolf and a mummy.

Wolf

REM PLAYER 0

210 POKE J+1,32:POKE J+2,224:POKE J+3,32:POKE J+4,32:POKE J+5,63:POKE J+6,63:POKE J+7,63:POKE J+8,33

220 POKE J+9,33:POKE J+10,33

Mummy

209 REM PLAYER 0

210 POKE J+1,28:POKE J+2,42:POKE J+3,28:POKE J+5,127:POKE J+7,93

220 POKE J+9,28:POKE J+11,20:POKE J+13,20

229 REM PLAYER 1

230 POKE K+2,20:POKE K+4,8:POKE K+6,93:POKE K+8,93:POKE K+10,20:POKE K+12,20:POKE K+14,54

In closing remember POKE 704 through POKE 707 can be changed to give Lancelot or the monsters a different color. Next issue will be the entire listing of the game 'Black Knight', and believe me, it will be worth the wait. Until then, Happy Adventuring!



NEW THE MONKEY WRENCH II A PROGRAMMERS AID FOR ATARI 800 NEW AND IMPROVED — 18 COMMANDS

If you are a person who likes to monkey around with the ATARI 800, then THE MONKEY WRENCH II is for you!! Make your programming tasks easier, less time-consuming and more fun. Why spend extra hours working on a BASIC program when the MONKEY WRENCH can do it for you in seconds. It can also make backup copies of boot type cassette programs. Plugs into the right slot and works with ATARI BASIC cartridge.

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VARIABLES — Display all BASIC variables and their current value. Scrolling — Use the START & SELECT keys to display BASIC lines automatically. Scroll up or down BASIC program. FIND STRING — Find every occurrence of a string. XCHANGE STRING — Find every occurrence of a string and replace it with another string. MOVE LINES — Move lines from one part of program to another part of program. COPY LINES — Copy lines from one part of program to another part of program. FORMATTED LIST — Print BASIC program in special line format and automatic page numbering. DISK DIRECTORY — Display Disk Directory. CHANGE MARGINS — Provides the capability to easily change the screen margins. MEMORY TEST — Provides the capability to test RAM memory. CURSOR EXCHANGE — Allows usage of the cursor keys without holding down the CTRL key. UPPER CASE LOCK — Keeps the computer in the upper case character set. HEX CONVERSION — Converts a hexadecimal number to a decimal number. DECIMAL CONVERSION — Converts a decimal number to a hexadecimal number. MONITOR — Enter the machine language monitor.

In addition to the BASIC commands, the Monkey Wrench also contains a machine language monitor with 16 commands used to interact with the powerful features of the 6502 microprocessor.



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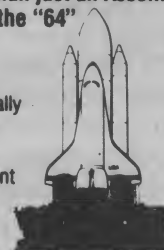
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New Products

Two New Games From PDI

The first being Android, a game designed to challenge both beginning and advance game addicts. A remote-control android has been sent to a distant asteroid. The android's mission is to gather treasures from the labyrinth buried beneath the asteroid's surface. The labyrinth is guarded by armed robots. It has five levels, and the android must pass through all the levels to escape and return to earth with the treasures. You see the maze through the eyes of the android in 3-D. It requires 40K with an Atari 810 Disk Drive; an Atari 410 Program Recorder is needed to use optional voice track.

The second game called Clipper: Around The Horn In 1850 also includes an optional cassette voice track. As captain of one of the famed "greyhounds of the sea", the player must make his or her way from New York to San Francisco, via Cape Horn at the southernmost tip to South America. Shrewd planning and wise choices are needed to make this trip in the shortest possible time, with the greatest possible amount of money remaining in the treasury at voyage's end. There are many perils along the way, including fierce storms, deadly calms, and mutinies. Masts may be snapped by howling winds, illnesses may befall the crew, icebergs and submerged reefs may destroy the ship. The game features exceptional nautical graphics. The cassette version requires 24K. The disk version requires 32K. The two versions are sold together, in one package, for a retail price of \$29.95.

Program Design Inc.
95 East Putnam Avenue
Greenwich, CT 06830
(203) 661-8799

A.E.

This new game from Broderbund Software puts you against squadrons of menacing sting rays that are streaking down from the sky to attack you. You're doomed to be pestered forever unless you drive these waves of A.E. ("rays") out of the solar system, deep into the outer wastelands of space. A.E. is a

fast-paced arcade style game with excellent graphics and eight levels of play. Available on disk with 48K. Played with joystick or paddle. Suggested retail price is \$34.95.

Broderbund Software Inc.
1938 Fourth St.
San Rafael, CA 94901
(415) 456-6424

Super Mailer

This mailing program claims to have more features than any other mailing list available. Some of the standard features include creating and adding to the data file, sort by name, zip, or data line, and search on name or data line. Edit, modify, and printing any combination of entries are just a few more of the many standard features this program includes. Some of the Advance features include the merging of files, a wild card search, and the ability to use any printer. The program is written in Basic with machine language subroutines, and is written to be very easy to use. The program requires 48K, Basic, and 1 Disk Drive (2 Drives optional). The suggested retail price of this program is \$49.95.

Royal Software
2160 West 11th Avenue
Eugene, Oregon 97402
(503) 683-5361

Thinking Game From Avalon Hill

Avalon Hill has released a computer version of its popular Facts In Five game. Computer Facts is a game of knowledge which puts players against time and each other. It includes options for solitaire play, doubles play, and party play.

In each round of the game five subject categories are selected from a list of more than 1000. Five letters are associated with each category, and the players supply answers that start with the designated letters.

Game difficulty can be controlled, modes for family and education are available. The sand clock timer and scoring system add to the challenge. This new thinking game from Avalon Hill requires 46K and its retail price is \$26.

Avalon Hill Game Company
4517 Hartford Road
Baltimore, MD 21214

New Products cont'd.

Air Combat Game

Wingman is a combat simulator that allows one to four players to fly their fighter jets to defend their own territory while attacking and destroying the territory of the enemy. The game uses split screen techniques to display the battle positions of the two flight formation leaders. Each aircraft can be loaded with bombs, guns, or missiles, depending on the particular combat strategic mission. The winning combat pilots are the flight formation team that has the most net points from both offensive and defensive action.

The game territory consists of a European ground scenario, constructed randomly with each new game, that is 11 screens wide and contains airfields, fuel dumps, radars, military concentrations, and anti-aircraft guns and missiles.

Wingman is a action arcade type game that requires strategic combat planning to obtain an Allied victory. This game from MicroProse requires 40K Disk or Cassete and sells for \$34.95.

Microprose Software
One Caribou Court
Parkton, Maryland 21120

Raving Reviewer cont'd.

the inevitable pile of manure lurking. Corner kicks and throw-ins almost invariably favor the defending team. The goalie is practically incapable of saving a shot from inside of the eighteen yard box and other (admittedly nit-picking) problems.

Fortunately these problems are shared by both teams, so they do not spoil the game.

SOCCER
Playability:8
Challenge:9
Graphics:9.5
Sound:6
Documentation:8
Overall Rating:8.5

Jake T.S.D. cont'd.

is good, there are a few complaints I have in this area. Firstly, the explosion of the Japanese aircraft is very questionable. It seems as if the whole program stops to see the aircraft explode. Secondly, the exact similarities between all the Japanese aircraft is a bit dissapointing. The programmer should have made the scout planes, bombers and zeroes three different shapes. Besides these few complaints I found the fast moving graphics to be great.

The sound of Hellcat Ace was quite good. The main attraction here is how you can hear the sound of your engine rev higher as you change speed.

The documentation of the game was great! I especially enjoyed the scenario write ups on the battles you encounter.

Overall I would definitely recommend Hellcat Ace to anyone. Its the type of game you'll have many "all nighters" (No one night stand stuff!). Furthermore, the way I figure it, it is better for you to fight W.W.II on the screen rather than watching some dumb actor do it for you!

HELLCAT ACE
MicroProse Software
One Caribou Court
Parkton, Maryland 21120
Playability:8
Challenge:9
Graphics:7.5
Sound:7.5
Documentation:8.5
Overall:8.2

Interview cont'd.

Q. What new programs does Adventure International have planned for the near future?

A. We have all sorts of new programs under development.

Q. What direction do you feel computer games are going?

A. Well we have got more sophisticated, and the days of '3D tic tac toe' and 'name that song' are long gone.

Titan Lander

by Bob Cockroft

Need 48K

Cruising 387,550,000 miles from the sun in your Phobus class landing vehicle, you have just entered the outer extremities of the Saturnian system. Ahead lies the giant ring planet with its multiple bands of toxic gases and its overwhelming brilliance over the blackness of deep space behind. To the right, you now see the disc of Saturn's outermost satellite, Phoebe. It's cold, barren surface sliding silently past your viewer and disappearing into the empty darkness which it emerged. Moving deeper and deeper into the Saturnian gravitational well, another object has just appeared on your viewer. It is the bright and protruding image of Lapetus. Like a giant iceball glowing in brilliance as it reflects the light rays from the distance Sun, lapetus's nature becomes apparent. It is a frozen, silent ball forever locked in a orbit around Saturn. Gliding away from this forbidden world, a warmer and more massive satellite is soon picked up on your viewer. After many months of space travel, the destination is in sight. The Saturn's largest Satellite, Titan is before you. As you get closer differences between Titan and other satellites become apparent. Unlike others, Titan has some atmosphere. Clouds of what looks like methane gas have obscured any surface features.

As your space craft automatically goes into an orbit around Titan, you review the instructions given to you on Earth by the project Supervisors. The instruction say to land at ten predetermined positions on the surface of Titan thus allowing the ships' computer to automatically perform a number of tests. The locations of the landing sights will be displayed by the computer as reddish rectangles.

All of what you do on Titan will be carefully analyzed by thousands of people who have worked for this landing project. Therefore, the performance you do could determine your future position in the space program. The project Supervisors must have confidence in your space piloting abilities if you are to be promoted or continue at your present assignment.

The most important thing to do in order to

gain confidence would be to successfully land the ship. After reading the landing instructions, you know that the landing sights the project Supervisors have chosen, get progressively harder. More confidence will be gained for landing a harder sight than a easier one. Their are ten different levels and if you make it to the tenth the'll be a special surprise.

It cost millions of dollars to build one of the Phobus landing vehicles you are piloting. Therefore project Supervisors are looking for a pilot who can land the vehicle with minimum wear and tear. In other words, you must land both with little downward movement and with little horizontal movement.

The project Supervisors are always looking for perfection. A pin point landing is held with much esteem. Much confidence would be gained for this type of preformance. You have been told that the landing sights are larger than what the vehicle needs. A landing in the centre of one of these would be beneficial.

After landing the vehicle press the START BUTTON to see how the project Supervisors rated your landing. Also when starting a level it is important that you apply an upward thrust or you may run into an asteroid before you even get started.

If you don't have time to type in the program below then send \$10.00 for the disk and \$6.00 for cassette version. Or send a blank disk or cassette and \$5.00 to:

R.O.M.

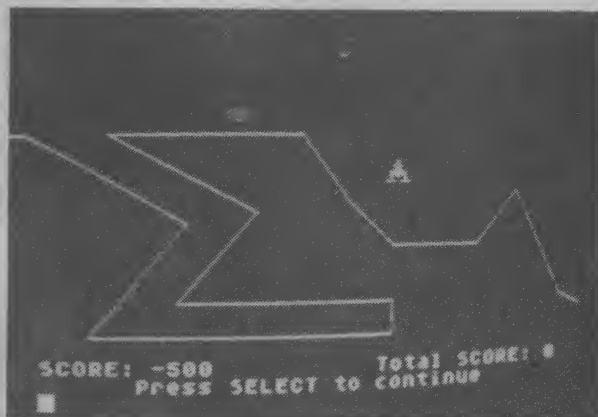
P.O. BOX 252

MAPLE RIDGE, B.C. V2X 7G1

Remember this version of 'Titan Lander' is a little different then the one listed in this magazine. It has two more levels and more game features.

```
1 REM ***** Titan Lander *****
2 REM ***** by Bob Cockroft *****
3 REM ***** ROM Magazine *****
4 DIM YN$(5):GOTO 16000
9 SC=0:TSC1=0:TSC2=0:TSC3=0:TSC4=0
:TSC=0:LIFE=1
10 GRAPHICS 1:COLOR 1:SETCOLOR 2,16,1
12 POKE 1589,40:POKE 1590,4:POKE
1591,13:POKE 1574,0
```


Titan Lander cont'd.



```

16 FOR RR=1 TO 75:SOUND 1,162,10,10
:SOUND 0,81,10,10:NEXT RR
17 POSITION 4,5:? #6;"titan lander":FOR
RR=1 TO 25:SOUND 0,144,10,10:SOUND
1,72,10,10:NEXT RR
18 POSITION 9,10:? #6;"by":FOR RR=1 TO
50:SOUND 0,136,10,10:SOUND
1,68,10,10:NEXT RR
19 FOR RR=1 TO 25:SOUND
0,162,10,10:SOUND 1,81,10,10:NEXT RR
20 POSITION 4,12:? #6;"BOB
COCKROFT":FOR RR=1 TO 75:SOUND
0,114,10,15:SOUND 1,57,10,15:POKE
708,RR:NEXT RR

```

```

21 SOUND 0,1,1,0:SOUND 1,1,1,0:FOR RR=1
TO 700:NEXT RR
29 I=PEEK(106)-40:J3=I*256+1792
30 S=1
32 FOR WW=1 TO 10:NEXT WW
33 PL=1:GRAPHICS 1:SETCOLOR
2,16,1:POSITION 4,17:? #6;"PRESS
start":POSITION 4,19:? #6;"TO CONTINUE"
34 POSITION 1,5:? #6;"HOW MANY
PLAYERS?":POSITION 1,7:? #6;"USE select
BUTTON"
35 IF PEEK(53279)=5 THEN PL=PL+1
36 IF PL=5 THEN PL=1
37 POSITION 18,5:? #6;PL
38 FOR PLL=1 TO 50:NEXT PLL:IF
PEEK(53279)<>6 THEN 35
39 POSITION 2,10:? #6;"HOW MANY SHIPS?"
40 IF PEEK(53279)=5 THEN LIFE=LIFE+1
42 IF LIFE=6 THEN LIFE=1
44 POSITION 17,10:? #6;LIFE
46 FOR PLL=1 TO 50:NEXT PLL:IF
PEEK(53279)<>6 THEN 39
48 LIFE1=LIFE:LIFE2=LIFE:LIFE3=LIFE
:LIFE4=LIFE
70 FOR USE=1 TO PL
72 IF USE=1 AND LIFE1<>0 THEN 80
73 IF USE=2 AND LIFE2<>0 THEN 80
74 IF USE=3 AND LIFE3<>0 THEN 80
75 IF USE=4 AND LIFE4<>0 THEN 80
77 GOTO 8990
80 GRAPHICS 1:SETCOLOR 2,16,1:POSITION
3,9:? #6;"READY PLAYER ";USE:POSITION
6,12:? #6;"LEVEL ";S
82 FOR HL=1 TO 75
83 IF USE=1 THEN POSITION 6,14:?
#6;"SHIPS: ";LIFE1
84 IF USE=2 THEN POSITION 6,14:?
#6;"SHIPS: ";LIFE2
85 IF USE=3 THEN POSITION 6,14:?
#6;"SHIPS: ";LIFE3
86 IF USE=4 THEN POSITION 6,14:?
#6;"SHIPS: ";LIFE4
89 NEXT HL
90 IF S=1 THEN 100
91 IF S=2 THEN 200
92 IF S=3 THEN 300
93 IF S=10 THEN 1000
94 IF S=4 THEN 400
95 IF S=5 THEN 500
96 IF S=6 THEN 600
97 IF S=7 THEN 700

```

Basic Listing

```
98 IF S=8 THEN 800
99 IF S=9 THEN 900
100 REM ** SCREEN 1 **
102 HORZ3=130
105 VERT3=175
110 SIZE3=255
115 MAXUP=50
120 MAXDOWN=250
125 STREN=15
130 MAXAST=150
135 MAXAST1=88
199 GOTO 5000
200 REM ** SCREEN 2 **
202 HORZ3=101
205 VERT3=185
210 SIZE3=255
215 MAXUP=52
220 MAXDOWN=200
225 STREN=14
230 MAXAST=125
235 MAXAST1=68
299 GOTO 5000
300 REM ** SCREEN 3 **
302 HORZ3=78
305 VERT3=160
310 SIZE3=255
315 MAXUP=60
320 MAXDOWN=198
325 STREN=14
330 MAXAST=120
335 MAXAST1=65
399 GOTO 5000
400 REM ** SCREEN 4 **
402 HORZ3=118
405 VERT3=180
410 SIZE3=255
415 MAXUP=64
420 MAXDOWN=197
425 STREN=14
430 MAXAST=110
435 MAXAST1=58
499 GOTO 5000
500 REM ** SCREEN 5 **
502 HORZ3=129
505 VERT3=166
510 SIZE3=255
515 MAXUP=68
520 MAXDOWN=190
525 STREN=12
530 MAXAST=95
535 MAXAST1=38
```

```
599 GOTO 5000
600 REM ** SCREEN 6 **
602 HORZ3=143
605 VERT3=143
610 SIZE3=255
615 MAXUP=75
620 MAXDOWN=180
625 STREN=12
630 MAXAST=80
635 MAXAST1=38
699 GOTO 5000
700 REM ** SCREEN 7 **
702 HORZ3=120
705 VERT3=182
710 SIZE3=255
715 MAXUP=75
720 MAXDOWN=179
725 STREN=14
730 MAXAST=70
735 MAXAST1=40
799 GOTO 5000
800 REM ** SCREEN 8 **
802 HORZ3=111
805 VERT3=187
810 SIZE3=255
815 MAXUP=75
820 MAXDOWN=179
825 STREN=14
830 MAXAST=65
835 MAXAST1=40
899 GOTO 5000
900 REM ** SCREEN 9 **
902 HORZ3=140
905 VERT3=180
910 SIZE3=255
915 MAXUP=75
920 MAXDOWN=175
925 STREN=12
930 MAXAST=60
935 MAXAST1=35
999 GOTO 5000
1000 REM ** SCREEN 10 **
1002 HORZ3=186
1005 VERT3=185
1010 SIZE3=255
1015 MAXUP=70
1020 MAXDOWN=170
1025 STREN=10
1030 MAXAST=10
1035 MAXAST1=30
1999 GOTO 5000
```

Basic Listing

```
5000 POKE 53248,0:POKE 53249,0:POKE 53250,0:POKE 53251,0
5005 POKE 53252,0:POKE 53253,0:POKE 53254,0:POKE 53255,0
5020 POKE 1681,HORZ3:POKE 1682,VERT3:POKE 1683,SIZE3:POKE 1584,MAXUP:POKE 1585,M
AXDOWN:POKE 1583,STREN
5025 POKE 1586,MAXAST:POKE 1587,MAXAST1
5500 IF S=1 THEN 6000
5505 IF S=2 THEN 6100
5510 IF S=3 THEN 6200
5520 IF S=4 THEN 6300
5530 IF S=5 THEN 6400
5540 IF S=6 THEN 6500
5550 IF S=7 THEN 6600
5560 IF S=8 THEN 6700
5570 IF S=9 THEN 6800
5580 IF S=10 THEN 6900
5999 REM ***** SCREEN 1 *****
6000 GRAPHICS 8:SETCOLOR 2,16,1
6010 PLOT 1,150:DRAWTO 50,120:DRAWTO 75,130:DRAWTO 150,145:DRAWTO 200,145:DRAWTO
250,120:DRAWTO 275,100
6020 DRAWTO 300,125:DRAWTO 319,150
6025 POSITION 1,20:?" Press START BUTTON after landing"
6050 GOTO 8000
6099 REM ***** SCREEN 2 *****
6100 GRAPHICS 8:SETCOLOR 2,16,1
6110 PLOT 1,130:DRAWTO 25,90:DRAWTO 50,130:DRAWTO 75,140:DRAWTO 100,155:DRAWTO 1
25,155:DRAWTO 150,125
6120 DRAWTO 155,125:DRAWTO 175,100:DRAWTO 250,100:DRAWTO 260,87:DRAWTO 265,82:DR
AWTO 280,95:DRAWTO 290,100
6130 DRAWTO 300,100:DRAWTO 319,80
6150 GOTO 8000
6199 REM ***** SCREEN 3 *****
6200 GRAPHICS 8:SETCOLOR 2,16,1
6210 PLOT 1,120:DRAWTO 20,130:DRAWTO 40,150:DRAWTO 60,130:DRAWTO 77,130:DRAWTO 9
2,60:DRAWTO 150,110:DRAWTO 160,110
6220 DRAWTO 190,135:DRAWTO 225,140:DRAWTO 245,110:DRAWTO 260,100:DRAWTO 295,140:
DRAWTO 319,135
6250 GOTO 8000
6299 REM ***** SCREEN 4 *****
6300 GRAPHICS 8:SETCOLOR 2,16,1
6310 PLOT 1,100:DRAWTO 30,130:DRAWTO 60,100:DRAWTO 115,75:DRAWTO 117,100:DRAWTO
140,150:DRAWTO 157,150:DRAWTO 190,78
6320 DRAWTO 210,90:DRAWTO 220,75:DRAWTO 250,125:DRAWTO 290,112:DRAWTO 300,125:DR
AWTO 319,145
6350 GOTO 8000
6399 REM ***** SCREEN 5 *****
6400 GRAPHICS 8:SETCOLOR 2,16,1
6410 PLOT 1,130:DRAWTO 10,120:DRAWTO 60,100:DRAWTO 100,130:DRAWTO 150,120:DRAWTO
160,145:DRAWTO 180,145
6420 DRAWTO 200,120:DRAWTO 200,115:DRAWTO 190,100:DRAWTO 140,90:DRAWTO 145,80:DR
AWTO 200,75:DRAWTO 275,100
6425 DRAWTO 319,90
6430 POKE J3+VERT3+1,129:POKE J3+VERT3+2,195:POKE J3+VERT3+3,165:POKE J3+VERT3+4
,153:POKE J3+VERT3+5,153
6431 POKE J3+VERT3+6,165:POKE J3+VERT3+7,195:POKE J3+VERT3+8,129:POKE J3+VERT3+9
,129:POKE J3+VERT3+10,129
6450 GOTO 8000
```

Basic Listing

```
6499 REM ***** SCREEN 6 *****
6500 GRAPHICS 8:SETCOLOR 2,16,1
6510 PLOT 1,100:DRAWTO 50,120:DRAWTO 75,110:DRAWTO 100,110:DRAWTO 115,140:DRAWTO
130,150
6520 DRAWTO 210,150:DRAWTO 215,100:DRAWTO 210,90:DRAWTO 175,90:DRAWTO 168,95:DRA
WTO 168,130
6530 DRAWTO 140,130:DRAWTO 120,100:DRAWTO 125,80:DRAWTO 140,60:DRAWTO 250,60:DRA
WTO 300,75:DRAWTO 319,90
6540 PLOT 190,150:DRAWTO 190,110:PLOT 207,150:DRAWTO 207,110:PLOT 190,140:DRAWTO
207,140
6541 PLOT 190,130:DRAWTO 207,130:PLOT 190,120:DRAWTO 207,120
6550 GOTO 8000
6599 REM ***** SCREEN 7 *****
6600 GRAPHICS 8:SETCOLOR 2,16,1
6608 PLOT 1,100:DRAWTO 50,130
6609 DRAWTO 100,90:DRAWTO 180,75:DRAWTO 195,80:DRAWTO 178,86:DRAWTO 170,95:DRAWTO
170,105:DRAWTO 165,110
6610 DRAWTO 143,152:DRAWTO 162,152:DRAWTO 182,125
6620 DRAWTO 213,80:DRAWTO 222,100:DRAWTO 250,130:DRAWTO 300,140
6650 GOTO 8000
6699 REM ***** SCREEN 8 *****
6700 GRAPHICS 8:SETCOLOR 2,16,1
6710 PLOT 1,80:DRAWTO 50,120:DRAWTO 75,130:DRAWTO 80,110:DRAWTO 100,100:DRAWTO 1
40,75:DRAWTO 170,60:DRAWTO 200,80
6720 DRAWTO 200,100:DRAWTO 210,125:DRAWTO 175,120:DRAWTO 150,100:DRAWTO 125,100:
DRAWTO 125,155
6730 DRAWTO 145,155:DRAWTO 145,125:DRAWTO 175,145:DRAWTO 238,145:DRAWTO 236,100:
DRAWTO 300,90:DRAWTO 319,60
6750 GOTO 8000
6799 REM ***** SCREEN 9 *****
6800 GRAPHICS 8:SETCOLOR 2,16,1
6810 PLOT 1,60:DRAWTO 2,60:DRAWTO 90,100:DRAWTO 40,150:DRAWTO 200,150:DRAWTO 200
,132:DRAWTO 88,132:DRAWTO 125,95
6812 DRAWTO 55,60
6820 DRAWTO 150,60:DRAWTO 175,90:DRAWTO 200,110:DRAWTO 250,110:DRAWTO 275,85:DRA
WTO 305,135:DRAWTO 319,140
6850 GOTO 8000
6899 REM ***** SCREEN 10 *****
6900 GRAPHICS 8:SETCOLOR 2,16,1
6910 PLOT 1,60:DRAWTO 150,60:DRAWTO 20,70:DRAWTO 20,150:DRAWTO 250,150:DRAWTO 25
0,90:DRAWTO 275,90
6912 DRAWTO 275,155:DRAWTO 293,155
6920 DRAWTO 293,75:DRAWTO 232,75:DRAWTO 232,135:DRAWTO 38,135:DRAWTO 38,83:DRAWTO
319,60
6950 GOTO 8000
7999 POKE 53278,1
9000 POKE 1536+8,0
9005 Y=USR(26000)
8020 FOR X=VERT3 TO VERT3+50:POKE J3+X,0:NEXT X
8040 SCORE=PEEK(1576):SCORE1=PEEK(1577):SCORE2=PEEK(1578):SCORE3=PEEK(1580)
8050 SC=2*(SCORE+SCORE1+SCORE2+SCORE3)-1750+20*5
8051 IF SC<-250 THEN SC=-250
8055 IF PEEK(1574)=0 THEN L1=0
8056 IF PEEK(1574)=1 THEN L1=-1
8060 IF USE=1 THEN TSC1=TSC1+SC:TSC=TSC1:LIFE1=LIFE1+L1
8061 IF USE=2 THEN TSC2=TSC2+SC:TSC=TSC2:LIFE2=LIFE2+L1
8062 IF USE=3 THEN TSC3=TSC3+SC:TSC=TSC3:LIFE3=LIFE3+L1
```


Basic Listing

```

8063 IF USE=4 THEN TSC4=TSC4+SC:TSC=TSC4:LIFE4=LIFE4+L1
8064 ? "SCORE: ";? SC;? "          Total SCORE: ";? TSC
8075 ? "          Press SPACE BAR to continue"
8080 IF PEEK(764)<>33 THEN 8080
8081 POKE 764,65
8085 POKE 53248,0:POKE 53249,0:POKE 53250,0:POKE 53251,0:POKE 53252,0:POKE 53253
,0:POKE 53254,0:POKE 53255,0
8086 IF L1=0 AND S>9 THEN GOTO 15200
8087 IF L1=-1 THEN 72
8990 IF PL=1 AND LIFE1=0 THEN 15000
8991 IF PL=2 AND LIFE2=0 AND LIFE1=0 THEN 15000
8992 IF PL=3 AND LIFE1=0 AND LIFE2=0 AND LIFE3=0 THEN 15000
8993 IF PL=4 AND LIFE1=0 AND LIFE2=0 AND LIFE3=0 THEN 15000
8995 NEXT USE
8999 S=S+1
9000 GOTO 70
15000 GRAPHICS 0:SETCOLOR 2,16,1
15020 POSITION 16,3:?"RESULTS"
15030 POSITION 6,6:?"SCORE"," RANK"
15040 FOR PLAY=1 TO PL
15050 ? :? "  PLAYER ";PLAY;
15060 IF PLAY=1 THEN T=TSC1:?" "      ";TSC1;
15065 IF PLAY=2 THEN T=TSC2:?" "      ";TSC2;
15070 IF PLAY=3 THEN T=TSC3:?" "      ";TSC3;
15075 IF PLAY=4 THEN T=TSC4:?" "      ";TSC4;
15080 IF T<700 THEN ? "      Crater Maker":GOTO 15120
15085 IF T<800 THEN ? "      Cabin Boy "":GOTO 15120
15090 IF T<900 THEN ? "      Rookie "":GOTO 15120
15095 IF T<1000 THEN ? "      Scout "":GOTO 15120
15100 IF T<1100 THEN ? "      Pilot "":GOTO 15120
15105 IF T<1200 THEN ? "      Captain "":GOTO 15120
15110 IF T<1300 THEN ? "      COMMANDER "":GOTO 15120
15115 ? "          ** PRO ** "
15120 ? :NEXT PLAY
15140 GOTO 15245
15200 GRAPHICS 1:POKE 710,50
15210 POSITION 2,4:?"#6;"CONGRADULATIONS !"
15220 POSITION 4,8:?"#6;"You      have      SUCCESSFULLY      completed all the
levels. ";
15230 ? #6;"You are nowthe Titan lander PRO"
15240 POSITION 8,15:?"#6;"YeH!"
15245 REM
15247 ? :? "Would you like to play again?"
15248 INPUT YN$
15250 IF YN$="Y" THEN 9
15255 GOTO 15250
16000 GRAPHICS 0:SETCOLOR 2,16,1:?"The machine code will take a few      min
utes to load in."
16010 FOR HH=1 TO 1933:READ W:POKE 26000+HH-1,W:NEXT HH
16020 GOTO 9
16100 DATA 104,169,1,141,30,208,169,0,141,38,6,169,62,141,47,2,169,182,141,192,2
,165,106,56
16102 DATA 233,40,141,7,212,169,3,141,29,208,173,145,6,141,3,208,173,147,6,172,1
46,6,153,0
16104 DATA 127,153,1,127,169,255,141,20,6,141,21,6,169,0,141,9,6,141,7,6,141,17,
6,141
16106 DATA 18,6,141,5,6,141,0,6,141,4,6,141,16,6,141,23,6,141,36,6,141,37,6,141
16108 DATA 38,6,141,39,6,141,22,6,141,8,6,141,40,6,141,41,6,141,42,6,141,43,6,141
1

```

Basic Listing

16110 DATA 44,6,141,45,6,141,46,6,169,5,141,6,6,141,19,6,169,20,141,3,6,169,245,
 141
 16112 DATA 2,6,173,10,210,141,32,6,169,1,141,1,6,141,52,6,169,191,141,193,2,173,
 10,210
 16114 DATA 141,34,6,173,10,210,141,33,6,169,26,141,194,2,169,55,141,195,2,173,10
 ,210,141,35
 16116 DATA 6,173,52,6,201,0,240,17,238,52,6,201,255,208,10,169,0,141,52,6,169,14
 0,141,2
 16118 DATA 6,169,3,141,55,123,169,48,141,65,123,169,192,141,75,123,169,24,160,79
 ,153,1,126,153
 16120 DATA 7,126,169,126,153,2,126,153,3,126,153,5,126,153,6,126,169,255,153,4,1
 26,238,24,6
 16122 DATA 173,24,6,205,51,6,208,41,169,0,141,24,6,173,32,6,201,215,208,5,169,10
 ,141,32
 16124 DATA 6,238,32,6,141,2,208,173,33,6,201,40,208,5,169,210,141,33,6,206,33,6,
 141,4
 16126 DATA 208,238,25,6,173,25,6,205,51,6,208,41,169,0,141,25,6,173,34,6,201,215
 ,208,5
 16128 DATA 169,30,141,34,6,238,34,6,141,6,208,173,35,6,201,40,208,5,169,215,141,
 35,6,206
 16130 DATA 35,6,141,7,208,173,38,6,201,1,208,11,162,0,232,236,53,6,208,250,76,25
 1,106,173
 16132 DATA 43,6,201,0,240,11,162,0,232,236,53,6,208,250,76,147,108,172,3,6,173,2
 ,6,141
 16134 DATA 0,208,169,0,153,3,123,153,5,123,153,6,125,169,0,153,254,123,153,9,124
 ,169,8,153
 16136 DATA 255,123,153,0,124,153,2,124,169,28,153,1,124,153,3,124,169,62,153,4,1
 24,153,5,124
 16138 DATA 169,42,153,6,124,169,34,153,7,124,169,119,153,8,124,173,0,6,201,0,208
 ,36,162,0
 16140 DATA 232,236,54,6,208,250,173,1,6,201,0,208,11,162,0,232,236,55,6,208,250,
 76,126,104
 16142 DATA 201,2,208,3,76,53,104,76,91,104,172,3,6,173,2,6,141,1,208,173,4,6,201
 ,1
 16144 DATA 240,49,201,2,240,61,201,0,240,3,76,254,103,169,63,141,193,2,169,62,15
 3,7,125,153
 16146 DATA 8,125,169,24,153,9,125,153,10,125,169,16,153,11,125,153,12,125,153,13
 ,125,238,4,6
 16148 DATA 76,118,103,169,59,141,193,2,169,8,153,10,125,238,4,6,76,118,103,169,6
 1,141,193,2
 16150 DATA 169,24,153,10,125,169,4,153,11,125,153,12,125,153,13,125,238,4,6,76,1
 18,103,169,0
 16152 DATA 153,7,125,153,8,125,153,9,125,153,10,125,153,11,125,153,12,125,153,13
 ,125,153,14,125
 16154 DATA 153,15,125,153,16,125,153,17,125,153,4,125,153,5,125,153,6,125,169,0,
 141,4,6,141
 16156 DATA 0,6,76,118,103,173,2,6,24,105,7,141,5,208,172,3,6,174,22,6,224,0,240,
 8
 16158 DATA 206,22,6,169,0,76,85,104,238,22,6,169,12,153,4,123,76,126,104,174,2,6
 ,142,5
 16160 DATA 208,172,3,6,174,22,6,224,0,240,8,206,22,6,169,12,76,120,104,238,22,6,
 169,0
 16162 DATA 153,4,123,76,126,104,169,0,141,1,6,173,120,2,201,14,208,18,169,143,14
 1,1,210,169

Basic Listing

16208 DATA 18,6,240,14,76,189,106,169,255,141,21,6,206,2,6,76,189,106,169,255,14
1,21,6,238
16210 DATA 2,6,76,189,106,173,38,6,201,0,240,3,76,251,106,173,4,208,201,0,208,45
,173,8
16212 DATA 208,201,0,208,38,173,10,208,201,0,208,31,173,11,208,201,0,208,24,173,
14,208,201,0
16214 DATA 208,17,173,12,208,201,8,240,7,201,10,240,3,76,81,102,76,147,108,169,0
,141,193,2
16216 DATA 169,1,141,38,6,173,37,6,201,10,208,1,96,238,39,6,174,39,6,224,5,240,3
,76
16218 DATA 81,102,162,0,142,39,6,201,0,240,3,76,51,108,238,36,6,173,36,6,201,1,2
08,3
16164 DATA 75,141,0,210,169,1,141,0,6,76,235,104,201,10,208,8,169,2,141,1,6,76,1
38,104
16166 DATA 201,6,208,8,169,1,141,1,6,76,138,104,201,11,208,18,169,2,141,1,6,169,
50,141
16168 DATA 0,210,169,143,141,1,210,76,70,105,201,7,208,18,169,1,141,1,6,169,50,1
41,0,210
16170 DATA 169,143,141,1,210,76,70,105,169,0,141,0,210,141,1,210,76,70,105,173,9
,6,201,0
16172 DATA 240,39,169,1,141,9,6,238,7,6,173,7,6,236,48,6,208,20,162,0,142,7,6,16
9
16174 DATA 1,76,7,105,173,5,6,201,250,240,3,238,5,6,76,153,105,169,0,141,9,6,238
,8
16176 DATA 6,174,8,6,236,48,6,208,15,162,0,142,8,6,173,6,6,201,0,240,6,206,6,6
16178 DATA 76,153,105,169,1,141,9,6,141,5,6,76,153,105,173,9,6,201,0,240,42,169,
1,141
16180 DATA 9,6,238,7,6,174,7,6,236,49,6,208,15,162,0,142,7,6,173,5,6,201,0,240
16182 DATA 6,206,5,6,76,153,105,169,0,141,9,6,76,153,105,169,0,141,9,6,238,8,6,1
74
16184 DATA 8,6,236,49,6,208,15,162,0,142,8,6,173,6,6,201,253,240,3,238,6,6,76,15
3
16186 DATA 105,173,1,6,201,0,208,3,76,79,106,201,1,208,3,76,254,105,76,173,105,1
73,16,6
16188 DATA 201,0,240,41,169,1,141,16,6,238,17,6,174,17,6,224,50,208,15,162,0,142
,17,6
16190 DATA 173,18,6,201,0,240,6,206,18,6,76,79,106,169,0,141,16,6,76,79,106,169,
0,141
16192 DATA 16,6,238,17,6,174,17,6,224,50,208,15,162,0,142,17,6,173,19,6,201,150,
240,3
16194 DATA 238,19,6,76,79,106,173,16,6,201,0,240,33,169,1,141,16,6,238,17,6,174,
17,6
16196 DATA 224,50,208,15,162,0,142,17,6,173,18,6,201,150,240,3,238,18,6,76,79,10
6,169,0
16198 DATA 141,16,6,238,17,6,174,17,6,224,50,208,15,162,0,142,17,6,173,19,6,201,
0,240
16200 DATA 6,206,19,6,76,79,106,169,1,141,16,6,76,79,106,173,38,6,201,1,208,3,76
,251
16202 DATA 106,206,20,6,173,20,6,205,5,6,240,8,205,6,6,240,14,76,130,106,169,255
,141,20
16204 DATA 6,206,3,6,76,130,106,169,255,141,20,6,238,3,6,76,130,106,238,23,6,173
,23,6
16206 DATA 201,5,240,3,76,189,106,169,0,141,23,6,206,21,6,173,21,6,205,19,6,240,
8,205

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16220 DATA 76,82,107,201,75,208,3,76,147,107,201,150,208,3,76,201,107,201,175,20
8,3,76,253,107
16222 DATA 201,250,208,3,76,51,108,76,81,102,169,222,141,192,2,172,3,6,169,0,153
,254,123,153
16224 DATA 9,124,153,255,123,153,0,124,153,8,124,153,7,124,153,1,124,169,42,153,
2,124,153,6
16226 DATA 124,169,28,153,3,124,153,5,124,169,126,153,4,124,169,24,141,0,210,169
,14,141,1,210
16228 DATA 76,81,102,169,11,141,192,2,172,3,6,169,42,153,1,124,169,73,153,2,124,
169,28,153
16230 DATA 3,124,153,5,124,169,247,153,4,124,169,8,153,6,124,169,34,153,7,124,16
9,32,141,0
16232 DATA 210,169,14,141,1,210,76,81,102,169,53,141,192,2,172,3,6,169,24,153,1,
124,153,6
16234 DATA 124,169,36,153,2,124,153,5,124,169,67,153,3,124,169,194,153,4,124,169
,8,153,7,124
16236 DATA 169,100,141,0,210,169,5,141,1,210,76,81,102,169,56,141,192,2,172,3,6,
169,66,153
16238 DATA 0,124,153,7,124,169,129,153,1,124,153,6,124,169,0,153,2,124,153,3,124
,153,4,124
16240 DATA 153,5,124,153,8,124,169,60,141,0,210,169,10,141,1,210,76,81,102,172,3
,6,169,0
16242 DATA 153,254,123,153,255,123,153,0,124,153,1,124,153,2,124,153,3,124,153,4
,124,153,5,124
16244 DATA 153,6,124,153,7,124,153,8,124,153,3,123,153,4,123,153,5,123,153,5,125
,153,6,125
16246 DATA 153,7,125,153,8,125,153,9,125,153,10,125,153,11,125,153,12,125,153,13
,125,169,0,141
16248 DATA 0,210,141,1,210,238,37,6,173,43,6,201,0,240,1,96,76,81,102,173,6,6,56
,237
16250 DATA 47,6,48,3,76,251,106,173,43,6,201,0,240,13,173,31,208,201,6,208,3,76,
51,108
16252 DATA 76,81,102,169,1,141,43,6,169,255,56,237,6,6,141,40,6,169,255,56,237,1
8,6,141
16254 DATA 41,6,169,255,56,237,19,6,141,44,6,173,2,6,56,237,145,6,201,0,208,8,16
9,255
16256 DATA 141,46,6,76,241,108,141,45,6,48,6,169,255,56,237,45,6,141,42,6,169,0,
172,3
16258 DATA 6,153,7,125,153,8,125,153,9,125,153,10,125,153,11,125,153,12,125,153,
13,125,141,0
16260 DATA 210,141,1,210,153,3,123,153,4,123,76,81,102



Assembly Listing

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```

4E20 = 4E20
4E21 68
4E21 A901
4E23 BD1ED0
4E26 A900
4E28 BD2606
4E2B A93E
4E2D BD2F02
4E30 A9B6
4E32 BDC002
4E35 A56A
4E37 38
4E38 E92B
4E3A BD07D4
4E3D A903
4E3F BD1DD0
      = 7C00
      = 7B00
      = 7D00
      = 7E00
      = 7F00
      = 0600
      = 0601
      = 0602
      = 0603
      = 0604
      = 0605
      = 0606
      = 0607
      = 0608
      = 0609
      = 0610
      = 0611
      = 0612
      = 0613
      = 0614
      = 0615
      = 0616
      = 0617
      = 0618
      = 0619
      = 0620
      = 0621
      = 0622
      = 0623
      = 0624
      = 0625
      = 0626
      = 0627
      = 0628
      = 0629
      = 062A
      = 062B
      = 062C
      = D01F
      = 062D
      = 062E

```

```

ORG $6590
PLA
LDA #1
STA $D01E
LDA #0
STA $626
LDA #62
STA $22F
LDA #182
STA $2C0
LDA $6A
SEC
SRC #40
STA $D407
LDA #3
STA $D01D
PM SET $7C00
M1 SET $7B00
PM1 SET $7D00
PM2 SET $7E00
PM3 SET $7F00
THRUST SET $600
MICRO SET $601
HORZ SET $602
VERT SET $603
FAZE SET $604
UMOVE SET $605
DMOVE SET $606
USPEED SET $607
DSPEED SET $608
UM SET $609
HUM SET $610
UNSPD SET $611
LMOVE SET $612
LMOVE SET $613
COUNT SET $614
COUNT1 SET $615
CHANGE SET $616
SLOW SET $617
AST SET $618
AST1 SET $619
HORZ2 SET $620
MHOR0 SET $621
MHOR2 SET $622
MHOR3 SET $623
ECON SET $624
ECON1 SET $625
EXPL SET $626
EXCON SET $627
SCORE SET $628
SCORE1 SET $629
SCORE2 SET $62A
SCON SET $62B
SCORE3 SET $62C
CONSOL SET $D01F
PIN SET $62D

```

```

; CLEAR COLLISIONS
; SET P/M GRAPHICS
; COLOR (PLAYER 0)

;DECLARATION SECTION
;BASE LOCATION FOR MISSILES
;BASE PLAYER 1
;BASE PLAYER 2
;BASE PLAYER 3
;THRUST FLAG
;SIDE THRUST FLAG
;HORZ POS LANDER
;VERT POS LANDER
;THRUST TYPE
;UP ACCELERATION
;DOWN ACCELERATION
;UP COUNTER
;DOWN COUNTER
;VERT DIRECTION FLAG
;HORZ ACCEL COUNTER
;RIGHT ACCELERATION
;LEFT ACCELERATION
;RATE COUNTER
;CHANGE SIDE THRUST
;ASTERIOD COUNTER
;ASTERIOD COUNTER1
;HORZ POS PLAYER2
;HORZ POS MISSILE0
;HORZ POS MISSILE2
;HORZ POS MISSILE3
;EXPLOSION TYPE
;EXPLOSION LOOP
;EXPLOSION FLAG
;EXPLOSION SLOWER
;SCORE (VERT)
;SCORE (HORZ)
;SCORE (POS.)
;SCORE LOOP
;SCORE (HORZ)
;CONSOL FLAG
;STORE VALUE
;PIN POINT LANDING FLAG

```

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```

= 062F
= 0630
= 0631
= 0632
= 0633
= 0634
= 0635
= 0636
= 0637
STREN SET $62F
MAXUP SET $630
MAXDOWN SET $631
MAXAST SET $632
MAXAST1 SET $633
APEA SET $634
STP SET $635
STP1 SET $636
STP2 SET $637
LDA $691
STA $D003
LDA $693
LDY $692
STA PM3,Y
STA PM3+1,Y
LDA $255
STA COUNT
STA COUNT1
LDA #0
STA UM
STA USPEED
STA UHSPD
STA UMOVE
STA UMOVE
STA FAZE
STA HUM
STA SLOW
STA ECON
STA ECON1
STA EXPL
STA EXCON
STA CHANGE
STA DSPEED
STA SCORE
STA SCORE1
STA SCORE2
STA SCON
STA SCORE3
STA STORE
STA PIN
LDA #5
STA DMOVE
STA LMOVE
STA #20
STA VERT
STA #245
STA HORZ
LDA $D20A
STA HORZ2
LDA #1
STA MICRO
STA APEA
LDA #191
;GIVE VALUES TO VARIABLES
4E42 AD9106
4E45 BD03D0
4E48 AD9306
4E4B AC9206
4E4E 99007F
4E51 99017F
4E54 A9FF
4E56 BD1406
4E59 BD1506
4E5C A900
4E5E BD0906
4E61 BD0706
4E64 BD1106
4E67 BD1206
4E6A BD0506
4E6D BD0006
4E70 BD0406
4E73 BD1006
4E76 BD1706
4E79 BD2406
4E7C BD2506
4E7F BD2606
4E82 BD2706
4E85 BD1606
4E88 BD0806
4E8B BD2806
4E8E BD2906
4E91 BD2A06
4E94 BD2B06
4E97 BD2C06
4E9A BD2D06
4E9D BD2E06
4EA0 A905
4EA2 BD0606
4EA5 BD1306
4EA8 A914
4EAA BD0306
4EAD A9F5
4EAF BD0206
4EB2 ADDAD2
4EB5 BD2006
4EB8 A901
4EBA BD0106
4EBD BD3406
4EC0 A9BF
;COLOR (PLAYER1)

```

Assembly Listing

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```

4EC2 BDC102 STA $2C1
4EC3 ADOAD2 LDA $D20A
4ECB BD2206 STA MHOR2
4ECB ADOAD2 LDA $D20A
4ECE BD2106 STA MHORO

4ED1 A91A LDA #26
4ED3 BDC202 STA $2C2
4ED6 A937 LDA #55
4ED8 BDC302 STA $2C3
4ED8 ADOAD2 LDA $D20A
4EDE BD2306 STA MHORS

;COLOR (PLAYER 2)
;COLOR (PLAYER 3)
;HORZ POS. PLAYER 3
;HORZ=245 AT START

4EE1 AD3406 DRAW LDA APEA
4EE4 C900 CMP #0
4EE6 F011 ~4EF9 BEQ AB
4EEB EE3406 INC APEA
4EEB C9FF CMP #255
4EED D00A ~4EF9 BNE AB
4EEF A900 LDA #0
4EF1 BD3406 STA APEA
4EF4 A9BC LDA #140
4EF6 BD0206 STA HORZ
4EF9 A903 AB LDA #3
4EFB BD377B STA M1+55
4EFE A930 LDA #48
4EF0 BD417B STA M1+65
4F03 A9C0 LDA #192
4F05 BD4B7B STA M1+75
4F08 A918 LDA #24
4F0A A04F LDY #79
4F0C 99017E STA PM2+1,Y
4F0F 99077E STA PM2+7,Y
4F12 A97E LDA #126
4F14 99027E STA PM2+2,Y
4F17 99037E STA PM2+3,Y
4F1A 99057E STA PM2+5,Y
4F1D 99067E STA PM2+6,Y
4F20 A9FF LDA #255
4F22 99047E STA PM2+4,Y

4F25 EE1806 INC AST
4F28 AD1806 LDA AST
4F2B CD3306 CMP MAXAST
4F2E D029 ~4F59 BNE L251
4F30 A900 LDA #0
4F32 BD1806 STA AST
4F35 AD2006 LDA HORZ2
4F38 C9D7 CMP #215
4F3A D005 ~4F41 BNE AT
4F3C A90A LDA #10
4F3E BD2006 STA HORZ2
4F41 EE2006 AT INC HORZ2
4F44 BD0206 STA $D002
4F47 AD2106 LDA MHORO
4F4A C92B CMP #40
4F4C D005 ~4F53 BNE AT1

```

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```

A9D2 LDA #210
BD2106 STA MHORO
CE2106 AT1 DEC MHORO
BD04D0 STA $D004
EE1906 L251 INC AST1
AD1906 LDA AST1
CD3306 CMP MAXAST1
D029 ~4FBD BNE DRAM1
A900 LDA #0
BD1906 STA AST1
AD2206 LDA MHOR2
C9D7 CMP #215
D005 ~4F75 BNE AT2
A91E LDA #30
BD2206 STA MHOR2
EE2206 AT2 INC MHOR2
BD06D0 STA $D006
AD2306 LDA MHOR3
C92B CMP #40
D005 ~4F87 BNE AT3
A9D7 LDA #215
BD2306 STA MHOR3
CE2306 AT3 DEC MHOR3
BD07D0 STA $D007

AD2606 DRAW1 LDA EXPL
C901 CMP #1
D00B ~4F9F BNE LA20
A200 LDY #0
EB L600 INX
EC3506 CPX STP
DOFA ~4F96 BNE L600
ACBB53 JMP EXP
AD2B06 LA20 LDA SCON
C900 CMP #0
F00B ~4FB1 BEQ J10
A200 LDY #0
J70 INX
EC3506 CPX STP
DOFA ~4FAB BNE J70
AC2355 JMP PIS.
AD0306 J10 LDY VERT
AD0206 LDA HORZ
BD00D0 STA $D000
A900 LDA #0
99037B STA M1+3,Y
99057B STA M1+5,Y
99067D STA M1+6,Y
A900 LDA #0
99FE7B STA PM-2,Y
99097C STA PM+9,Y
A90B LDA #8
99FF7B STA PM-1,Y
99007C STA PM,Y
99027C STA PM+2,Y
A91C LDA #28
99017C STA PM+1,Y

;MOVE ASTERIIDS
;INCREMENT ASTERIIDS COUNTER
;STORE ORIGINAL VALUE
;MOVE HORZ. LANDER
;DRAW LANDER
;SLOW ASTERIOD DURING LANDING
;CHECK FOR EXPLOSION
;SLOW ASTERIOD DURING EXPLOSION
;INCREMENT ASTERIIDS COUNTER1
;VERT POS. LANDER

```

Assembly Listing

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```

4FDD 99037C STA PM+3,Y
4FE0 A93E LDA #62
4FE2 99047C STA PM+4,Y
4FE5 99057C STA PM+5,Y
4FE8 A92A LDA #42
4FEA 99067C STA PM+6,Y
4FED A922 LDA #34
4FEF 99077C STA PM+7,Y
4FF2 A977 LDA #119
4FF4 99087C STA PM+8,Y

4FF7 AD0006 LDA THRUST
4FFA C900 CMP #0
4FFC D024 BNE DOWN
4FFE A200 LDX #0
5000 EB LO INX
5001 EC3606 CPX STP1
5004 D0FA BNE L0

5006 AD0106 SIDE LDA MICRO
5009 C900 CMP #0
500B D008 BNE L70
500D A200 LDX #0
500F EB LO1 INX
5010 EC3706 CPX STP2
5013 D0FA BNE L01
5015 4C0E51 JMP L4
5018 C902 L70 CMP #2
501A D003 BNE L71
501C 4CC550 JMP RMICR
501F 4CEB50 L71 JMP LMICR

5022 AC0306 DOWN LDY VERT
5025 AD0206 LDA HORZ
5028 BD01D0 STA $D001
502B AD0406 LDA FAZE
502E C901 CMP #1
5030 F031 BEQ L2
5032 C902 CMP #2
5034 F03D BEQ L3
5036 C900 CMP #0
5038 F003 BEQ L5
503A 4CEB50 JMP L6

503D L5 LDA #63
503F BDC102 STA $2C1
5042 A93E LDA #62
5044 99077D STA PM1+7,Y
5047 99087D STA PM1+8,Y
504A A918 LDA #24
504C 99097D STA PM1+9,Y
504F 990A7D STA PM1+10,Y
5052 A910 LDA #16
5054 990B7D STA PM1+11,Y
5057 990C7D STA PM1+12,Y
505A 990D7D STA PM1+13,Y
505D EE0406 INC FAZE

5060 4C0650 JMP SIDE
5063 A93B L2 LDA #59
5065 BDC102 STA $2C1
5068 A908 LDA #8
506A 990A7D STA PM1+10,Y
506D EE0406 INC FAZE
5070 4C0650 JMP SIDE

5073 A93D L3 LDA #61
5075 BDC102 STA $2C1
5078 A918 LDA #24
507A 990A7D STA PM1+10,Y
507D A904 LDA #4
507F 990B7D STA PM1+11,Y
5082 990C7D STA PM1+12,Y
5085 990D7D STA PM1+13,Y
5088 EE0406 INC FAZE
508B 4C0650 JMP SIDE

508E A900 L6 LDA #0
5090 99077D STA PM1+7,Y
5093 99087D STA PM1+8,Y
5096 99097D STA PM1+9,Y
5099 990A7D STA PM1+10,Y
509C 990B7D STA PM1+11,Y
509F 990C7D STA PM1+12,Y
50A2 990D7D STA PM1+13,Y
50A5 990E7D STA PM1+14,Y
50A8 990F7D STA PM1+15,Y
50AB 99107D STA PM1+16,Y
50AE 99117D STA PM1+17,Y
50B1 990A7D STA PM1+4,Y
50B4 99057D STA PM1+5,Y
50B7 99067D STA PM1+6,Y
50BA A900 LDA #0
50BC BD0406 STA FAZE
50BF BD0006 STA THRUST
50C2 4C0650 JMP SIDE

50C5 AD0206 RMICR LDA HORZ
50C8 1B CLC
50C9 6907 ADC #7
50CB BD05D0 STA $D005
50CE AC0306 LDY VERT
50D1 AE1606 LDX CHANGE
50D4 E000 CPX #0
50D6 F008 BEQ L101
50D8 CE1606 DEC CHANGE
50DB A900 LDA #0
50DD 4CE550 JMP L102
50DE EE1606 L101 INC CHANGE
50E3 A90C LDA #12
50E5 99047B L102 STA M1+4,Y
50E8 4C0E51 JMP L4

50EB AE0206 LMICR LDX HORZ

```

Assembly Listing

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```

50EE BE05D0 STX $D005 ;PLACE LEFT THRUST
50F1 AC0306 LDY VERT
50F4 AE1606 LDZ CHANGE
50F7 E000 CPX #0
50F9 F008 ~5103 BEQ L103
50FB CE1606 DEC CHANGE
50FE A90C LDA #12
5100 AC0851 JMP L104
5103 EE1606 L103 INC CHANGE
5106 A900 LDA #0
5108 99047B L104 STA M1+4,Y
510B AC0E51 JMP L4

```

; DETERMINE MOVEMENT VECTORS

```

510E A900 L4 LDA #0
5110 BD0106 STA MICRO
5113 AD7802 LDA $278
5116 C90E CMP #14
5118 D012 ~512C BNE L10
511A A98F L11 LDA #143
511C BD01D2 STA $D201
511F A94B LDA #75
5121 BD00D2 STA $D200
5124 A901 LDA #1
5126 BD0006 STA THRUST
5129 4C7B51 JMP EX
512C C90A L10 CMP #10
512E D008 ~513B BNE L12
5130 A902 LDA #2
5132 BD0106 STA MICRO
5135 AC1A51 JMP L11
5138 C906 L12 CMP #6
513A D008 ~5144 BNE L14
513C A901 LDA #1
513E BD0106 STA MICRO
5141 AC1A51 JMP L11
5144 C90B L14 CMP #11
5146 D012 ~515A BNE L15
5148 A902 LDA #2
514A BD0106 STA MICRO
514D A932 LDA #50
514F BD00D2 STA $D200
5152 A98F LDA #143
5154 BD01D2 STA $D201
5157 AC0E51 JMP MA
515A C907 L15 CMP #7
515C D012 ~5170 BNE L16
515E A901 LDA #1
5160 BD0106 STA MICRO
5163 A932 LDA #50
5165 BD00D2 STA $D200
5168 A98F LDA #143
516A BD01D2 STA $D201
516D AC0E51 JMP MA
5170 A900 L16 LDA #0
5172 BD00D2 STA $D200

```

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```

5175 BD01D2 STA $D201
5178 AC0E51 JMP MA ;CHANGE VECTOR (UP)

517B AD0906 EX LDA UM
517E C900 CMP #0 ;NOW MOVE UP
5180 F027 ~51A9 BEQ DM0V
5182 A901 LDA #1
5184 BD0906 STA UM
5187 EE0706 INC USPEED
518A AD0706 LDA USPEED
518D EC3006 CPX MAXUP ;ACCELERATION COUNTER
5190 D014 ~51A6 BNE L25
5192 A200 LDA #0
5194 BE0706 STX USPEED
5197 A901 L100 LDA #1
5199 AC9751 JMP L100
519C AD0506 LDA UM0VE
519F C9FA CMP #250
51A1 F003 ~51A6 BEQ L25
51A3 EE0506 INC UM0VE
51A6 AC2952 L25 JMP LR ;INCREASE VERTICAL ACCEL.

51A9 A900 DM0V LDA #0 ;NOW MOVE DOWN
51AB BD0906 STA UM
51AE EE0806 INC DSPEED
51B1 AE0806 LDZ DSPEED
51B4 EC3006 CPX MAXUP ;ACCEL. COUNTER
51B7 D00F ~51CB BNE L27
51B9 A200 LDA #0
51BB BE0806 STX DSPEED
51BE AD0606 LDA DM0VE
51C1 C900 CMP #0
51C3 F006 ~51CB BEQ L30
51C5 CE0606 DEC DM0VE
51C8 AC2952 L27 JMP LR
51CB A901 STA UM
51CD BD0906 L30 LDA #1
51D0 BD0506 STA UM0VE
51D3 AC2952 JMP LR ;DECREASE ACCEL. COUNTER

51D6 AD0906 MA LDA UM
51D9 C900 CMP #0 ;CHANGE VECTOR DOWN
51DB F02A ~5207 BEQ DM0VD ;NOW MOVE UP
51DD A901 LDA #1
51DF BD0906 STA UM
51E2 EE0706 INC USPEED
51E5 AE0706 LDZ USPEED
51E8 EC3106 CPX MAXDOWN
51EB D00F ~51FC BNE L32
51ED A200 LDA #0
51EF BE0706 STX USPEED
51F2 AD0506 LDA UM0VE
51F5 C900 CMP #0

```


Assembly Listing

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```

51F7 F006 ^51FF      BEQ L34
51F9 CE0506          DEC UMOVE
51FC 4C2952          L32 JMP LR
51FF A900            L34 LDA #0
5201 BD0906          STA UM
5204 4C2952          JMP LR

5207 A900            DMOVD LDA #0
5209 BD0906          STA UM
520C CE0806          INC DSPEED
520F AE0806          LDX DSPEED
5212 EC3106          CPX MAXDOWN
5215 D00F ^5226      BNE L35
5217 A200            LDX #0
5219 BE0806          STX DSPEED
521C AD0606          LDA DMOVE
521F C9FD            CMP #253
5221 F003 ^5226      BEQ L35
5223 EE0606          INC DMOVE
5226 4C2952          L35 JMP LR

```

; HORIZONTAL MOVEMENT

```

5229 AD0106          LR LDA MICRO
522C C900            CMP #0
522E D003 ^5233      BNE L40
5230 4CDF52          JMP WAK
5233 C901            L40 CMP #1
5235 D003 ^523A      BNE L41
5237 4CBF52          JMP RHOR
523A 4C3D52          L41 JMP LHOR

```

; LEFT VECTOR
; RIGHT

```

523D AD1006          LHOR LDA HUM
5240 C900            CMP #0
5242 F029 ^526D      BEQ DHD
5244 A901            LDA #1
5246 BD1006          STA HUM
5249 EE1106          INC UHSPD
524C AE1106          LDX UHSPD
524F E032            CPX #50
5251 D00F ^5262      BNE L53
5253 A200            LDX #0
5255 BE1106          STX UHSPD
5258 AD1206          LDA RMOVE
525B C900            CMP #0
525D F006 ^5265      BEQ L54
525F CE1206          DEC RMOVE
5262 4CDF52          L53 JMP WAK
5265 A900            L54 LDA #0
5267 BD1006          STA HUM
526A 4CDF52          JMP WAK

```

; DECREASE HORZ ACCEL

; LEFT

```

526F A900            DHD LDA #0
526F BD1006          STA HUM
5272 EE1106          INC UHSPD
5275 AE1106          LDX UHSPD
5278 E032            CPX #50
527A D00F ^528B      BNE L57

```

; HORZ ACCEL, COUNTER

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```

527C A200            LDX #0
527E BE1106          STX UHSPD
5281 AD1306          LDA LMOVE
5284 C996            CMP #150
5286 F003 ^528B      BEQ L57
5288 EE1306          INC LMOVE
528B 4CDF52          L57 JMP WAK

528E AD1006          RHOR LDA HUM
5291 C900            CMP #0
5293 F021 ^52B6      BEQ DHR
5295 A901            LDA #1
5297 BD1006          STA HUM
529A EE1106          INC UHSPD
529D AE1106          LDX UHSPD
52A0 E032            CPX #50
52A2 D00F ^52B3      BNE L50
52A4 A200            LDX #0
52A6 BE1106          STX UHSPD
52A9 AD1206          LDA RMOVE
52AC C996            CMP #150
52AE F003 ^52B3      BEQ L50
52B0 EE1206          INC RMOVE
52B3 4CDF52          L50 JMP WAK

```

; INCREASE HORZ ACCEL.

; MOVEMENT VECTOR RIGHT
; RIGHT

; HORZ ACCEL, COUNTER

; INCREASE HORZ ACCEL.

; LEFT

; HORZ ACCEL.

; DECREASE HORZ ACCEL

; POKE MOVEMENT
; VERTICAL MOVEMENT

```

52DF AD2606          WAK LDA EXPL
52E2 C901            CMP #1
52E4 D003 ^52E9      BNE L421
52E6 4CB853          JMP EXP
52E9 CE1406          L421 DEC COUNT
52EC AD1406          LDA COUNT
52EF CD0506          CMP UMOVE
52F2 F003 ^52FC      BEQ L60
52F4 CD0606          CMP DMOVE
52F7 F00E ^5307      BEQ L61
52F9 4C1253          JMP WAR
52FC A9FF            L60 LDA #255
52FE BD1406          STA COUNT

```

; UP

5388	4C2355	PT JMP PTS	JUMP TO SCORE SECTION
5388	A900	EXP LDA #0	:EXPLOSION SECTION
5389	BD1C02	STA \$2C1	:ERASE THRUST FLAMES
5390	A901	LDA #1	
5392	BD2606	STA EXPL	:LOAD EXPLOSION FLAG
5395	AD2506	LDA ECDN1	:CHECK EXPLOSION LOOP
5398	C90A	CHP #10	
539A	D001 ~539D	BNE LA05	
539C	60	RTS	
539D	EE2706	LA05 INC EXCDN	:EXPLOSION COUNTER
53A0	AE2706	LDX EXCDN	:EXPLOSION SLOWER
53A5	E005	CPX #5	
53A8	F003 ~53AA	BEG L500	
53A7	4CE1AE	JMP DRAW	:RESET EXPLOSION SLOWER
53AA	A200	L500 LDX #0	
53AC	BE2706	STX EXCDN	
53AF	C900	CHP #0	
53B1	F003 ~53B6	BEG LA06	
53B3	4CC354	JMP A5	
53B6	EE2A06	LA06 INC ECDN	:INCREMENT EXPLOSION TYPE
53B9	AD2A06	LDA ECDN	:LOAD EXPLOSION TYPE
53BC	C901	CHP #1	:CHECK TYPE 1
53BE	D003 ~53C3	BNE L399	
53C0	4CE253	JMP A1	
53C3	C948	L399 CMP #75	:CHECK TYPE 2
53C5	D003 ~53CA	BNE LA00	
53C7	4C2354	JMP A2	
53CA	C996	LA00 CMP #150	:CHECK TYPE 3
53CC	D003 ~53D1	BNE LA01	
53CE	4C3954	JMP A3	
53D1	C94F	LA01 CMP #175	:CHECK TYPE 4
53D3	D003 ~53D8	BNE LA02	
53D5	4C8D54	JMP A4	
53D8	C9FA	LA02 CMP #250	:CHECK TYPE 5
53DA	D003 ~53DF	BNE LA03	
53DC	4CC354	JMP A5	
53DF	4CE1AE	LA03 JMP DRAW	
53E2	A9DE	A1 LDA #222	:TYPE 1
53EA	BDCC02	STA \$2C0	:COLOR
53E7	AC0306	LDY VERT	:VERTICAL LOCATION
53EA	A900	LDA #0	:DRAW
53EC	99FE7B	STA PM-2,Y	
53EF	99097C	STA PM+9,Y	
53F2	99FF7B	STA PM-1,Y	
53F5	99007C	STA PM,Y	
53FB	99087C	STA PM+8,Y	
53FE	99077C	STA PM+7,Y	
53FE	99017C	STA PM+1,Y	
5401	A92A	LDA #42	
5403	99027C	STA PM+2,Y	
5406	99067C	STA PM+6,Y	
5409	A91C	LDA #28	

Assembly Listing

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```

540B 99037C STA PM+3,Y
540E 99057C STA PM+5,Y
5411 A97E LDA #126
5413 99047C STA PM+4,Y
5416 A918 LDA #24
5418 8D00D2 STA $D200
541B A90E LDA #14
541D 8D01D2 STA $D201
5420 4CE14E JMP DRAW

5423 A90B A2 LDA #11
5425 8DC002 STA $2C0
5428 AC0306 LDY VERT
542B A92A LDA #42
542D 99017C STA PM+1,Y
5430 A949 LDA #73
5432 99027C STA PM+2,Y
5435 A91C LDA #28
5437 99037C STA PM+3,Y
543A 99057C STA PM+5,Y
543D A9F7 LDA #247
543F 99047C STA PM+4,Y
5442 A90B LDA #6
5444 99067C STA PM+6,Y
5447 A922 LDA #34
5449 99077C STA PM+7,Y
544C A920 LDA #32
544E 8D00D2 STA $D200
5451 A90E LDA #14
5453 8D01D2 STA $D201
5456 4CE14E JMP DRAW

5459 A935 A3 LDA #53
545B 8DC002 STA $2C0
545E AC0306 LDY VERT
5461 A918 LDA #24
5463 99017C STA PM+1,Y
5466 99067C STA PM+6,Y
5469 A924 LDA #36
546B 99027C STA PM+2,Y
546E 99057C STA PM+5,Y
5471 A943 LDA #67
5473 99037C STA PM+3,Y
5476 A9C2 LDA #194
5478 99047C STA PM+4,Y
547B A90B LDA #8
547D 99077C STA PM+7,Y
5480 A964 LDA #100
5482 8D00D2 STA $D200
5485 A905 LDA #5
5487 8D01D2 STA $D201
548A 4CE14E JMP DRAW

548D A93B A4 LDA #56
548F 8DC002 STA $2C0
5492 AC0306 LDY VERT
5495 A942 LDA #66

5497 99007C STA PM,Y
549A 99077C STA PM+7,Y
549D A981 LDA #129
549F 99017C STA PM+1,Y
54A2 99067C STA PM+6,Y
54A5 A900 LDA #0
54A7 99027C STA PM+2,Y
54AA 99037C STA PM+3,Y
54AD 99047C STA PM+4,Y
54B0 99057C STA PM+5,Y
54B3 99087C STA PM+8,Y
54B6 A93C LDA #60
54B8 8D00D2 STA $D200
54BB A90A LDA #10
54BD 8D01D2 STA $D201
54C0 4CE14E JMP DRAW

54C3 AC0306 A5 LDY VERT
54C6 A900 LDA #0
54C8 99FE7B STA PM-2,Y
54CB 99FF7B STA PM-1,Y
54CE 99007C STA PM,Y
54D1 99017C STA PM+1,Y
54D4 99027C STA PM+2,Y
54D7 99037C STA PM+3,Y
54DA 99047C STA PM+4,Y
54DD 99057C STA PM+5,Y
54E0 99067C STA PM+6,Y
54E3 99077C STA PM+7,Y
54E6 99087C STA PM+8,Y
54E9 99037B STA M1+3,Y
54EC 99047B STA M1+4,Y
54EF 99057B STA M1+5,Y
54F2 99057D STA PM+5,Y
54F5 99067D STA PM+6,Y
54F8 99077D STA PM+7,Y
54FB 99087D STA PM+8,Y
54FE 99097D STA PM+9,Y
5501 990A7D STA PM+10,Y
5504 990B7D STA PM+11,Y
5507 990C7D STA PM+12,Y
550A 990D7D STA PM+13,Y
550D A900 LDA #0
550F 8D00D2 STA $D200
5512 8D01D2 STA $D201
5515 EE2506 INC ECON1
5518 AD2B06 LDA SC0N
551B C900 CMP #0
551D F001 BEQ JB
551F 60 RTS
5520 4CE14E JB JMP DRAW

5523 AD0606 PTS LDA DMOVE
5526 38 SEC
5527 ED2F06 SBC STREN
552A 3003 ~552F BMI J57
552C 4CB853 JMP EXP

; TYPE 2
; COLOR
; VERTICAL LOCATION
; DRAW

; TYPE 3
; COLOR
; VERTICAL LOCATION
; DRAW

; TYPE 4
; COLOR
; VERTICAL LOCATION
; DRAW

; SOUND
; SOUND
; SOUND
; SOUND
; TYPE 5
; ERASE EXPLOSION

; ERASE SIDE THRUST
; ERASE BOTTOM THRUST

; NO SOUND
; INCREMENT EXPLOSION LOOP
; LOAD SCORE LOOP
; IF SCORE LOOP IS 1 THEN END
; SCORE SECTION
; CHECK LANDER DOES NOT HIT TOO HARD
; GOTQ EXPLOSION

```

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552F	AD2B06	J57 LDA SC0N	;SCORE LOOP COUNTER
5532	C900	CMF #0	;IF 0 THEN DETERMINE SCORE
5534	FOOD ~5543	BEG J6	
5536	AD1F00	LDA CONSOL	;CHECK IF START BUTTON IS PRESSED
5539	C906	CMF #6	;YES: CLEAR LANDER DATA
553B	D003 ~5540	BNE J7	;NO: CONTINUE
553D	4CC354	JMP A5	
5543	4CE14E	J7 JMP DRAW	
5545	A901	J6 LDA #1	;SET SCORE LOOP
5548	8D2B06	STA SC0N	;SCORE SECTION
554A	A9FF	LDA #255	;DOWN MOVEMENT
554B	ED0406	SBC DMOVE	
554E	8D2B06	STA SCORE	
5551	39FF	LDA #255	
5553	38	SEC	
5554	ED1206	SBC RMOVE	;RIGHT MOVEMENT
5557	8D2906	STA SCORE1	
555A	A9FF	LDA #255	
555C	38	SEC	
555D	ED1306	SBC LMOVE	;LEFT MOVEMENT
5560	8D2C06	STA SCORE3	
5563	AD0206	LDA HORZ	
5566	38	SEC	
5567	ED9106	SBC \$691	
556A	C900	CMF #0	
556C	D008 ~5576	BNE J51	
556E	A9FF	LDA #255	
5570	8D2E06	STA PIN	
5573	4C8155	JMP J50	
5576	8D2D06	J51 STA STORE	
5579	3006 ~5581	BMI J50	
557B	A9FF	LDA #255	
557D	38	SEC	
557E	ED2D06	SBC STORE	
5581	8D2A06	J50 STA SCORE2	
5584	A900	LDA #0	
5586	AC0306	LDA VERT	
5589	99077D	STA PM1+7,Y	
558C	99087D	STA PM1+8,Y	
558F	99097D	STA PM1+9,Y	
5592	990A7D	STA PM1+10,Y	
5595	990B7D	STA PM1+11,Y	
5598	990C7D	STA PM1+12,Y	
559B	990D7D	STA PM1+13,Y	
559E	8D00D2	STA #D200	
55A1	8D01D2	STA #D201	
55A4	99037B	STA M1+3,Y	
55A7	99047B	STA M1+4,Y	
55AA	4CE14E	JMP DRAW	

;STORE VALUE

;ERASE THRUST

;PIN POINT LANDING

;MEASURE CLOSENESS OF LANDING

;LEFT MOVEMENT

;RIGHT MOVEMENT

;DOWN MOVEMENT

;SET SCORE LOOP

;NO: CONTINUE

;CHECK IF START BUTTON IS PRESSED

;IF 0 THEN DETERMINE SCORE

;SCORE LOOP COUNTER

ATARI Macro Assembler Ver 1.0A Page 15
D1:LANDER.

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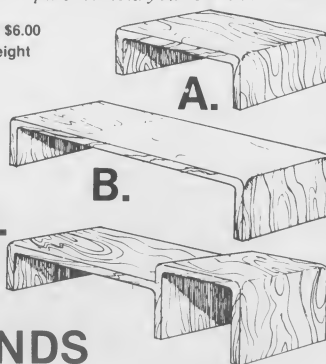
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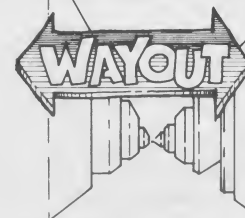
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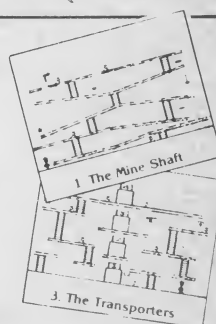
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